DOCUMENT RESUME

ED 205 609 TM 810 519

TITLE Connecticut Assessment of Educational Progress, 1979-80. Science. Technical Report.
INSTITUTION National Evaluation Systems, Inc., Amherst, Mass.
SPONS AGENCY Connecticut State Board of Education, Hartford. Bureau of Research, Planning, and Evaluation.
PUB DATE Apr 81
NOTE 266p.

EDRS PRICE MF01/PC11 Plus Postage.
DESCRIPTORS *Academic Achievement: *Comparative Testing: *Educational Assessment: Elementary Secondary Education: Grade 4: Grade 8: Grade 11: Measurement Objectives: Multiple Choice Tests: Questionnaires: *Science Tests: Scientific Literacy: *Scores: State Programs: Student Attitudes: Testing Programs
IDENTIFIERS Connecticut: Connecticut Assessment of Educational Progress

ABSTRACT

The Connecticut Assessment of Educational Progress (CAEP) is a continuing program designed to measure the efficiency of educational programs offered by public schools. During 1979-80, grades 4, 8, 11 were tested in science. The assessment goals were: to provide information on the quality of education in Connecticut: to collect and compare data with the 1974-75 science assessment information, gauge statewide progress and determine future policy: to compare Connecticut students' achievement with that of other students nationwide: for school districts to use assessment information to implement their own programs: to produce achievement tests measuring specified skills: and to produce student questionnaires which investigate attitudinal and other student variables which may relate to achievement. The first three chapters contain a summary of the design and methodology of the Science Assessment. Remaining chapters present questionnaires and achievement results for all three grade levels. Copies of the test instruments, along with computer results reports, appear in the appendixes. (Author/AEF)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

Connecticut Assessment of Educational Progress

SCIENCE 1979-80

TECHNICAL REPORT

ED205609

SCOPE OF INTEREST NOTICE
The ERIC Facility has assigned this document for processing to: TM | SE

In our judgement, this document is also of interest to the clearinghouses noted to the right. Indexing should reflect their special points of view.

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

CAEP

CONNECTICUT STATE
BOARD OF EDUCATION

TM810 519

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

D. W. Hudspeth

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Connecticut Assessment of Educational Progress
Science
1979-80

TECHNICAL REPORT

Prepared by:

National Evaluation Systems, Inc.
30 Gatehouse Road
Amherst, Massachusetts 01004

Prepared for:

Connecticut State Board of Education
Bureau of Research, Planning and Evaluation

April, 1981

TABLE OF CONTENTS

Page

OVERVIEW 1
Introduction 1
Measurement Instruments 2
Organization of This Report 5

CHAPTER 1: SAMPLING DESIGN AND IMPLEMENTATION 6
Introduction 6
Requirements of the Sampling Design 6
General Framework of the Sampling Plan 7
Determining the Sample Size 9
Implementation of School Sampling 10
Implementation of Student Sampling 15
Student Participation in Testing 16

CHAPTER 2: DATA COLLECTION AND HANDLING 18
Field Contact 18
Test Administration 19
Coding, Scoring, and Data Processing 20
Sampling Weights 20
The Local Option 21

CHAPTER 3: DATA ANALYSIS AND INTERPRETATION 23
Goals of the Data Analysis Plan 23
Data Analysis 23
Interpretive Issues 24

CHAPTER 4: 1979-80 ACHIEVEMENT RESULTS 26
Introduction 26
Achievement on the Total Test 27
Achievement on Goal Areas and Objectives. 27
Achievement on Items Across Age Groups 35

CHAPTER 5: COMPARING CONNECTICUT WITH THE NATION AND THE NORTHEAST REGION 37
Introduction 37
Interpretation of Results 37
Summary of Results 38

CHAPTER 6: COMPARISONS OF THE 1979-80 ACHIEVEMENT RESULTS WITH THE 1974-75 RESULTS 53
Introduction 53
Interpretive Issues 53
Achievement Comparisons 54

TABLE OF CONTENTS (continued)

Page

CHAPTER 7: COMPARING TOTAL TEST ACHIEVEMENT BY SIZE OF COMMUNITY AND REGION OF THE STATE. 63
Introduction 63
Summary of Results for Stratification Variables 63

CHAPTER 8: RESULTS OF THE STUDENT QUESTIONNAIRE 67
Introduction 67
Summary of Results for Student Questionnaire Reporting Variables 67
Summary Profiles. 76
Additional Highlights of the Student Questionnaire. 77
Comparisons of Student Attitudes from CAEP 1974-75 to CAEP 1979-80 88

APPENDIX A - Copies of Test Items for Fourth-, Eighth-, and Eleventh-graders, with Corresponding Percentages of All Students Selecting Each Response 90

APPENDIX B - Copies of Student Questionnaire Instruments. 178

APPENDIX C - Tables of Achievement Results by Reporting Groups on Total Test and Goals 194

LIST OF TABLES AND FIGURES

Page

TABLE 1.1 Schematic Diagram of Sampling Strata - Grade 4 12

TABLE 1.2 Schematic Diagram of Sampling Strata - Grade 8 13

TABLE 1.3 Schematic Diagram of Sampling Strata - Grade 11 14

TABLE 1.4 Number of Participating Students in Each Grade Level by Stratum 17

FIGURE 4.1 Achievement on Total Test and Goal Areas by Grade Level 28

TABLE 4.2 Decile Distribution of Total Test Scores - Grade 4 . . . 29

TABLE 4.3 Decile Distribution of Total Test Scores - Grade 8 . . . 30

TABLE 4.4 Decile Distribution of Total Test Scores - Grade 11. . . 31

FIGURE 4.5 Achievement on Objectives for Grade 8 32

FIGURE 4.6 Achievement on Objectives for Grade 11 34

TABLE 4.7 Comparison of Achievement Across Grade Levels on Common Items by Goal Area 36

FIGURE 5.1 Comparing Connecticut, the Nation, and the Northeast by Total Test and Goal Areas - Grade 4 41

FIGURE 5.2 Comparing Connecticut, the Nation, and the Northeast by Total Test and Goal Areas - Grade 8 42

FIGURE 5.3 Comparing Connecticut, the Nation, and the Northeast by Total Test and Goal Areas - Grade 11. 43

TABLE 5.4 Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast Grade 4 44

TABLE 5.5 Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast Grade 8 46

TABLE 5.6 Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast Grade 11 49

LIST OF TABLES AND FIGURES (continued)

Page

FIGURE 6.1 Year-to-Year Comparisons for Repeated Items - Grade 4. . 55
FIGURE 6.2 Year-to-Year Comparisons for Repeated Items - Grade 8. . 56
FIGURE 6.3 Year-to-Year Comparisons for Repeated Items - Grade 11 . 57

TABLE 6.4 Year-to-Year Comparisons of Achievement on Individual Items - Grade 4 58
TABLE 6.5 Year-to-Year Comparisons of Achievement on Individual Items - Grade 8 59
TABLE 6.6 Year-to-Year Comparisons of Achievement on Individual Items - Grade 11 61

FIGURE 7.1 Achievement on Total Test by Size of Community 65
FIGURE 7.2 Achievement on Total Test by Region Excluding Big City Students. 66

TABLE 8.1 Achievement by Student Questionnaire Reporting Groups. . 68
TABLE 8.2 Frequency Distribution of Student Questionnaire Responses for All Three Grade Levels 79

OVERVIEW

Introduction

PURPOSE. The 1979-80 school year marked the eighth consecutive year in which the State of Connecticut conducted the Connecticut Assessment of Educational Progress (CAEP). This assessment program, as mandated by the Connecticut General Assembly, is a continuing program designed to measure objectively the adequacy and efficacy of the educational programs offered by the public schools. This year, students in Grades 4, 8, and 11 were tested in science. The goals of the 1979-80 assessment were:

- to provide useful and accurate information on the quality of education in Connecticut to educators, school administrators, students, parents, and the public at large
- to collect data for comparing student growth in science to previous assessment information in order to gauge statewide progress and to determine future educational policy
- to collect information permitting the comparison of the present achievement of Connecticut students with the achievement of students nationally
- to enable school districts to collect information and to implement their own assessment practices by making statewide assessment procedures and tests available.

BACKGROUND. The CAEP program is modeled after the National Assessment of Educational Progress (NAEP) in its basic goals, design, and implementation. NAEP was founded in 1964 and began testing in 1969. The goal of the National Assessment program is to provide continuous, systematic reporting of the knowledge, skills, understanding, and attitudes of American children and young adults based on annual national surveys. Each year one or more subject areas are tested. The NAEP testing program generates data on national achievement levels against which statewide data can be compared.

Since 1971, Connecticut statewide assessments have been conducted in reading, career guidance, science, mathematics, career education, and citizenship/social studies. Because a previous science assessment had been conducted in 1974-75 this year's science assessment was of particular importance. Not only are national comparisons possible, as in all CAEP assessments, but additional state comparisons utilizing the results from the 1974-75 assessment can be made.

This year, the assessment in science was conducted by National Evaluation Systems, Inc. (NES) of Amherst, Massachusetts under contract to the Connecticut State Department of Education (CSDE). Staff of both NES and CSDE worked jointly on all aspects of the assessment program. Additional support was provided by a Science Advisory Committee which consisted of educators from across the state involved in many aspects and levels of science education. Major program components included the development of the test instruments, administration of the tests to a sample of students across the state in Grades 4, 8, and 11, analysis and interpretation of the data obtained in the statewide testing, and dissemination of the results of the assessment. In conjunction with the statewide assessment, CSDE provided local districts an opportunity to use the state's custom-designed materials to assess their own students through the Local Assessment Option (see page 21).

Measurement Instruments

The goal of the test development phase of the assessment was to produce:

1) customized achievement tests composed of exercises matched to learning objectives in science, and

2) student questionnaires with which to collect information on individual student and attitudinal variables.

THE OBJECTIVES. The first activity of the Science Advisory Committee, in cooperation with State Department of Education and National Evaluation Systems staff, was the development of appropriate testing instruments with which to measure student achievement in science. In order to accomplish this task, it was necessary to identify and select goal areas and objectives to be measured by the assessment instruments. Drawing entirely from NAEP materials, three goal areas were identified which were considered of high priority and appropriate to all three target grade levels. The goal areas were then further subdivided to yield seven objectives. A list of these goals and objectives appears below.

GOALS AND OBJECTIVES

I. Know the fundamental facts and principles of science.

  1. Biological science
  2. Physical science
  3. Earth science

II. 4. Apply the fundamental principles of science.

III. Understand and apply the processes of science.

  5. Analysis of data
     Tabular data
     Graphic representation (includes models)
  6. Observation and inference
  7. Identifying and controlling variables

Note: Goals are indicated by Roman numerals, objectives by Arabic numerals.

THE TESTS. After the objectives had been defined, test items were selected to measure the skills specified by the objectives. In addition, each of the three tests were developed according to the following guidelines.

- The objectives assessed should focus on basic science principles and concepts.
- In no way should the objectives to be tested attempt to represent all of the skills and concepts being taught at a particular grade level.
- Approximately 50% of the items on each test should consist of items used in the 1974-75 CAEP science assessment.

The item pool consisted of items drawn from NAEP materials and included items previously administered in the 1974-75 CAEP assessment. Each item in the pool was reviewed and discussed. Some of the NAEP items were modified slightly to make the items more appropriate to Connecticut's needs (for example, by changing measurement units from the English to the metric system, or by changing the wording of an item to eliminate sexism). A total of seven items for Grade 4, thirteen items for Grade 8, and eleven items for Grade 11 were subjected to minor modification. With the exception of Item 45 on the test for Grade 4, all items were multiple choice in format. (Item 45 was a fill-in item.) After careful consideration, 45, 65, and 75 items were chosen to be administered at grade levels 4, 8, and 11, respectively.

In order to make grade-level comparisons, some items were selected to appear on more than one test form. Test instruments for Grades 4 and 8 included ten identical items; fifteen identical items were selected to appear on the tests for both Grades 8 and 11. One item was selected for administration at all three grade levels. The number of test items unique to a test form was, therefore, 35, 41, and 60 for Grades 4, 8, and 11, respectively.

As stated above, some of the items which appeared on the 1974-75 assessment instruments were selected for inclusion on the 1979-80 test forms. Inclusion of items from the previous CAEP assessment makes year-to-year item comparisons possible. Of the 45 items selected for the 1979-80 Grade 4 test, 23, or 51%, had been included on the 1974-75 test form. The testing instrument for the present assessment in Grade 8 included 32, or 49%, repeated items; 38, or 51%, of the items for the 1979-80 Grade 11 test form had been included in the 1974-75 assessment.

THE STUDENT QUESTIONNAIRE. A student questionnaire instrument was developed for each grade level. The purposes of these questionnaires were:

1) to identify student characteristics and student attitudes about science that might bear a relationship to achievement, and

2) to provide a general characterization of students that might prove useful in subsequent curriculum planning.

Although the final student questionnaire instruments were similar for the three grade levels, they were not identical. Eighteen items appeared on the student questionnaires for fourth-grade students; 16 questionnaire items were selected for the Grade 8 test form; and 29 questionnaire items were selected for inclusion on the Grade 11 test form. Questionnaires were printed at the front of each test booklet and were administered to all participating students.

Organization of This Report

The first three chapters of this report contain a summary of the design and methodology for the Science Assessment. The remaining chapters present the results of the questionnaires and the achievement results for all three grade levels. Copies of the test instruments, along with computer results reports, appear in the Appendices.

CHAPTER 1

SAMPLING DESIGN AND IMPLEMENTATION

Introduction

To increase the reliability of the data collected and to reduce the impact of statewide testing activities on schools, a sampling approach to assessment was adopted. A two-stage stratified cluster design was used to select a random sample of students from the population for each grade level. The sampling plan was based on the actual distribution of the student population for grades 4, 8, and 11 in the 1977-78 school year.

This section discusses in detail the requirements of the sampling design, the general framework of the sampling plan, and the procedures used in determining sample sizes. In addition, it presents the procedures for implementing sampling of schools and students, as well as a description of the numbers of students actually participating in testing activities.

Requirements of the Sampling Design

The sampling procedure was designed to protect the anonymity of all students, schools, and school districts participating in the assessment. Several requirements were met by the sampling design:

(1) Each sample was representative of the entire target population in terms of the selected stratification variables (region and size of community).

(2) The size of each sample drawn was sufficiently large to generalize reliably to the performance of all fourth-, eighth-, and eleventh-grade students.

(3) All Connecticut public schools containing students in Grades 4, 8, and 11 were eligible for selection.

(4) The sample was a probability sample at all stages of the selection process; that is, each eligible school had a chance of being selected proportional to its population, and each student in the state had a positive chance of being chosen.

(5) Students were clustered into school buildings and selection of schools occurred before the assignment of individual students from within these schools.

Testing was limited to Grades 4, 8, and 11, and only those age-eligible students (as defined by NAEP) enrolled in the target grade for that age were selected for testing. That is, only those students (1) in the fourth grade born during calendar year 1970 (9-year-olds), (2) in the eighth grade born during calendar year 1966 (13-year-olds), and (3) in the eleventh grade born between October 1, 1962 and September 30, 1963 (17-year-olds) were eligible for selection into the CAEP sample. NAEP selects samples from all students born in the designated time periods regardless of current grade, while CAEP sampled only those age-eligible students in the target grades. Therefore, the "age" and "grade" terminologies may both be used appropriately for this assessment (bearing in mind that NOT ALL students of a given age or grade were eligible for testing). For purposes of reporting the results of the statewide assessment, the grade designation (e.g., fourth-graders) is used.

General Framework of the Sampling Plan

Two stratification variables were selected for the sampling plan: (1) size of community, and (2) educational region of the state.

Categories of the size of community variable were defined as follows:

(1) "Big Cities" -- towns whose population exceeds 100,000 (Bridgeport, Hartford, New Haven, Stamford, and Waterbury)

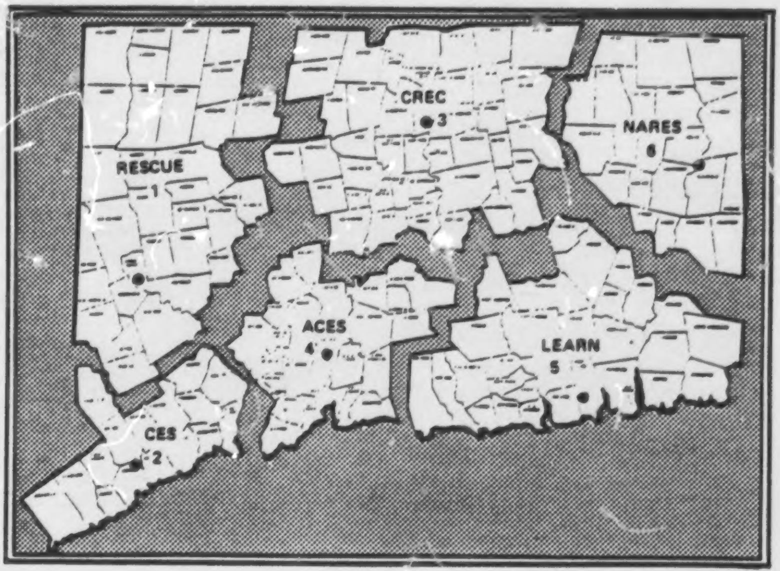
(2) "Fringe Cities" -- towns which are contiguous with Big Cities and whose population exceeds 10,000 (e.g., East Hartford, Naugatuck, Trumbull)

(3) "Medium Cities" -- towns whose population exceeds 25,000 and which are not Big Cities or Fringe Cities (e.g., Bristol, Manchester, Westport)

(4) "Smaller Places" -- all other towns (e.g., Bethany, Rocky Hill, Stafford)

The map below shows the division of the state into regions based on the six Connecticut Regional Educational Service Centers as identified in the key below the map.

MAP OF CONNECTICUT REGIONAL EDUCATIONAL SERVICE CENTERS



3/79

1. Regional Educational Services Concepts (through) Unified Effort (RESCUE)
2. Cooperative Education Services (CES)
3. Capital Region Education Council (CREC)
4. Area Cooperative Educational Services (ACES)
5. Project LEARN
6. Northeast Area Regional Educational Services (NARES)

According to this stratification plan, schools with similar characteristics could be grouped together and assigned to one of the 24 stratification categories which resulted from a crossing of the two variables.

Determining the Sample Size

INTRODUCTION. The size of the sample of students to be tested was determined on the basis of (1) the level of precision desired by CSDE in making generalizations to the performance of the population as a whole and of the various stratified reporting groups, (2) the size of the total student population in the state at each grade level, (3) the size of the student population in each stratum, and (4) the size of the student population in each category of the strata.

SAMPLING PRECISION. Whenever estimates about a population are to be made based on data collected from a sample, those estimates are subject to error. Error is the probable difference between the score of the sample and the true score of the population. Sampling precision refers to the maximum degree of error which will be tolerated in making generalizations. Toleration of a sampling error of .02 (two percentage points), for example, would mean the following: if, in a sample of fourth-graders, an average of 61% of the items on a test is answered correctly, then the true score of the population probably lies between 59% and 63%.

The above probability statement is made in educational practice at a 95% confidence level. That is, the true score, in the above example, is expected to lie somewhere between 59% and 63% for 95 out of 100 samples; for 5% of the samples, the true score will lie outside this range. This level of confidence is generally considered sufficient for educational research.

The greater the level of precision desired, the greater the number of students that must be tested. A desire for precision must be balanced against potential costs. In general, increasing precision increases the cost--defined in terms of both dollars and time (of students, test administrators, and clerical-administrative personnel). As the sample size is increased, there is a political cost as well, resulting primarily from the increased impact on the activities of participating schools.

Taking into consideration the foregoing concerns, CSDE adopted a level of precision tolerating a 2% (two percentage points) error for the total population. Based on the size of the overall population of students, and the proposed sampling design, it was determined that a sample of 2,400 students for each age/grade level would be sufficient for these purposes. To allow for the inevitable attrition of students from those selected to participate, it was therefore necessary to select at least 2,880 students for testing in each grade level.

SIZE OF THE SAMPLE IN EACH CELL OF THE SAMPLING FRAME. Given the total number of students to be tested, the allocation of numbers of students to each sampling category or cell was made on the basis of the ratio of students in the cell population relative to the total student population. That is, the proportion of all students assigned to a particular cell corresponded to the proportion of fourth-, eighth-, or eleventh-graders (relative to the total in-grade population) contained in the cell.

However, due to the need to oversample cells with unusually small populations, the proportional distribution of sampled students was not exactly equivalent to population parameters. Sampling weights, ultimately computed on the basis of the actual number of students taking the test, insure that the average scores reported here for the population and reporting groups are correctly estimated from the sample scores.

Implementation of School Sampling

STEP 1. The first step in implementing the sampling design was the construction of a sampling frame--that is, a list of all sampling units (in this case, school buildings) in the population to be sampled. A sampling frame of all eligible schools was constructed based on information provided by CSDE. When the information was updated and verified, each school was assigned a region status and a size-of-community status.

STEP 2. Following this assignment, the next step was to divide the sampling frame into separate frames for each stratified category. The frame was broken down into 24 separate lists, one corresponding to each of the 24 stratification categories. Schools were listed along with their estimated fourth-, eighth-, or eleventh-grade enrollments and cumulative population totals.

STEP 3. The next step was to select the schools from the frame for a GIVEN CATEGORY. This selection occurred by using the list of all eligible schools and their cumulative student enrollment. The following procedure was used:

(1) The total student population for the category was noted.

(2) This total was divided by twice the number of testing sessions assigned to the category, yielding value X. (The number of assigned testing sessions was doubled because two samples were being selected--one for Science and one for Mathematics.)

(3) A random number table was used to select a random number (N) between 1 and X, and the school whose cumulative population interval contained the Nth student was selected.

(4) Value X was added to the random number (N) (and repeatedly to all succeeding values) until the total number of schools required from the category was selected. Each "selection" represented a "test session," and a given school could, therefore, be selected more than once, depending upon the size of its enrollment.

(5) Finally, the selected schools were assigned to participate in either the Science or the Mathematics assessments, such that an equal number of test sessions would be conducted for each assessment.

This procedure, implemented separately for each category and at each grade level, insured that all students and schools within a stratum had a positive probability of being selected; the number of students who could be selected from each eligible school was proportional to the size of the school.

Tables 1.1, 1.2, and 1.3 present the final allocation of students for the Science assessment to the individual categories of the sampling frame as well as the corresponding population parameters.

The top portion of each cell shows the number of students in the category population, while the bottom portion shows the total number of students in the given grade level selected for possible participation (i.e., before attrition).

A total of 120 test administrations were assigned across all categories at each age level. Each test administration represented the testing of 24 students, for a total of 2,880 selected students at each age level. This provision allowed for an attrition of 17%, which was expected on the basis of previous educational assessments. All estimates of the performance of the population and respective reporting groups were made from properly weighted data based on actual participation statistics.

TABLE 1.1

Schematic Diagram of Sampling Strata

GRADE 4

Size of Community

		Big Cities	Fringe Cities	Medium Cities	Smaller Places	Totals
R	RESCUE	0 0	523 72	1126 72	2912 168	4561 312
E	CES	2801 192	2937 192	1852 120	1251 96	8841 600
G	CREC	1816 120	2940 192	3864 240	4406 240	13026 792
I	ACES	2388 168	3088 216	2387 144	1740 120	9603 648
O	LEARN	0 0	0 0	1317 96	3636 240	4953 336
N	NARES	0 0	0 0	0 0	1855 192	1855 192
	TOTAL	7005 480	9488 672	10546 672	15800 1056	42839 2880

NOTE: The top entry in each cell is the number of students in the population. The bottom entry is the number of students to be tested.

TABLE 1.2

Schematic Diagram of Sampling Strata

GRADE 8

Size of Community

		Big Cities	Fringe Cities	Medium Cities	Smaller Places	Totals
R	RESCUE	0 0	539 72	1186 72	3173 168	4898 312
E	CES	3214 192	3596 216	2227 144	1434 96	10471 648
G	CREC	1854 120	3333 192	4137 216	4637 216	13961 744
I	ACES	2677 168	3542 216	2753 168	1753 96	10725 648
O	LEARN	0 0	0 0	1479 96	4024 240	5503 336
N	NARES	0 0	0 0	0 0	1940 192	1940 192
	TOTAL	7745 480	11010 696	11782 696	16961 1008	47498 2880

NOTE: The top entry in each cell is the number of students in the population. The bottom entry is the number of students to be tested.

TABLE 1.3

Schematic Diagram of Sampling Strata

GRADE 11

Size of Community

		Big Cities	Fringe Cities	Medium Cities	Smaller Places	Totals
R	RESCUE	0 0	418 72	1321 72	2832 168	4571 312
E	CES	3038 192	3901 216	2215 144	1382 96	10536 648
G	CREC	1510 96	3736 168	4303 216	4412 216	13961 696
I	ACES	2217 144	3882 264	2968 192	1367 96	10434 696
O	LEARN	0 0	0 0	1769 120	3423 216	5192 336
N	NARES	0 0	0 0	0 0	1899 192	1899 192
	TOTAL	6765 432	11937 720	12576 744	15315 984	46593 2880

NOTE: The top entry in each cell is the number of students in the population. The bottom entry is the number of students to be tested.

Implementation of Student Sampling

INTRODUCTION. Once the participating schools had been selected, the second stage of the plan was implemented. In the second stage, students were randomly selected from the eligible pool within each selected school. This process was repeated separately for each assigned test session. No stratification variables were employed in the student frame. It was assumed that, given the number of students being sampled, the random selection process would generate an acceptably even distribution of males and females in the total sample for each test.

ELIGIBILITY. All students at the appropriate age levels within the specified grade denominations were considered eligible for testing except for those who were non-English speaking or who were handicapped (physically, mentally, or emotionally) in such a way that they could not respond to the test.

PROCEDURE. In order to implement the sampling of students, the principal of each selected school received a letter which indicated the number of testing sessions assigned to the school and requested a roster listing the names of all students who had the appropriate birthdates. Students born during the 1970 calendar year were considered eligible for the fourth-grade test, those born during the 1966 calendar year were considered eligible for the eighth-grade test, and students born between October 1, 1962 and September 30, 1963 were considered eligible for the eleventh-grade test.

When the rosters had been returned and verified for each grade level, all of the ineligible students were deleted from the pool for each school. Remaining students were numbered sequentially, each student within a school receiving a unique number. Then, using a table of random numbers, 24 students were selected for each testing session assigned to a school. If a given school contained less than 24 eligible students, all eligible students were selected.

Principals were provided with a separate list of selected students for each testing session in the school. Each list was again reviewed by the principals to ensure that ineligible students, according to the guidelines above, were not included for testing. Where necessary, NES provided substitutes for any ineligible students listed on the rosters, assigning them in order of their random selection.

Student Participation in Testing

Table 1.4 provides a summary of the numbers of sampled students actually participating in the assessment within each reporting category for each grade level. The overall participation rate was quite good. In Grades 4 and 8, more students participated in testing than had been predicted. At the eleventh-grade level, total participation was about 96% of the number anticipated.

The major causes for attrition were (1) student absence on the day of testing, (2) student withdrawal or transfer from the school, (3) student failure to complete the test due to illness, and (4) particularly at the eleventh-grade level, student refusal to participate in the assessment.

TABLE 1.4

Number of Participating Students in Each Grade Level by Stratum

Reporting Category	Actual Sample Size		
	Grade 4	Grade 8	Grade 11
TOTAL	2513	2612	2301
REGION			
RESCUE	266	298	238
CES	522	586	490
CREC	724	660	685
ACES	547	593	510
LEARN	267	303	250
NARES	187	172	128
SIZE OF COMMUNITY			
Big Cities	350	395	304
Fringe Cities	642	658	592
Medium Cities	584	632	647
Smaller Places	937	927	758

CHAPTER 2

DATA COLLECTION AND HANDLING

Field Contact

Contact with school and district personnel, initiated in May and June of 1979, was designed to alert local personnel to the assessment and to provide detailed information on both the statewide and local option phases of the assessment. Related activities included substantial contact with school and district personnel, both by mail and by telephone.

After initial contact with local personnel had been made by CSDE, NES mailed letters to the superintendents of every Connecticut school district describing both phases of the assessment, inviting them to participate in the Local Option, and enclosing sample results reports for the Local Option. Close contact was maintained throughout the school year with those districts which chose to participate in the Local Option in order to provide direction and assistance as needed.

Following is a brief description of subsequent contact by NES staff at each age level with school and district personnel involved in the statewide sample:

(1) A letter was mailed to superintendents of all school districts involved, outlining the schedule of events and listing by name those schools selected in their districts as well as the number of test administrations (consisting of 24 students per session) which were scheduled to be conducted in each school.

(2) A letter was mailed to principals of all selected schools describing the assessment program. The letter outlined the scheduled principal responsibilities, indicated the number of test administrations assigned, and requested the submission of a roster of all age- and grade-eligible students.

(3) NES' staff of trained test administrators made telephone calls to all participating principals to schedule appointments for testing sessions. Every effort was made to accommodate the scheduling needs of individual schools.

(4) A letter was mailed to all participating principals providing the names of selected students for each testing session.

NES staff made every effort to describe fully the aims and activities of the program, to describe with clarity the responsibilities of school personnel, and to foster cooperation with the program. Throughout the contact period, NES encouraged school personnel to call collect with any questions or concerns relative to the assessment.

Test Administration

To limit the burdens placed on school personnel, and to standardize administration procedures for the assessment, 11 Connecticut residents with backgrounds in education were hired and trained by NES staff to conduct testing in the schools. A test administrators' training workshop was conducted by the NES staff prior to test administration for each grade level. At these workshops, test administrators were thoroughly trained with respect to (1) the research design of the assessment program, (2) school and student selection procedures, (3) test administration, (4) administration of the student questionnaires, (5) classroom procedures (including assembling of students, introducing the test, distributing and collecting materials, and handling of common and unusual situations), (6) special responsibilities (including advance telephone calls to principals to verify appointments; procedures for cancellation, postponement, or rescheduling of testing sessions; and handling of student rosters), and (7) field editing procedures. These procedures were described in detail in a test administrators' manual.

Tests were administered in October and November 1979 for Grade 4, in January and February 1980 for Grade 8, and in April 1980 for Grade 11. Testing activities involved 115 schools in 69 school districts for Grade 4, 84 schools in 68 districts for Grade 8, and 66 schools in 55 districts for Grade 11. In total, student participation in testing activities numbered 2,513 for Grade 4, 2,612 for Grade 8, and 2,301 for Grade 11. Each testing session lasted about 60 minutes. The test administration procedures were similar to those used by NAEP but did not include paced audiotapes accompanying the tests. Testing sessions began with a brief explanation of the purpose of the tests, followed by the administration of the student questionnaires which were read aloud to the students. When all students had completed the questionnaires, the directions for answering exercises were read aloud, and the students then proceeded to answer the test questions independently.

Following each testing session, test administrators performed a preliminary edit of testing materials and coded each response booklet with a district, school, and class identification number. At the close of each testing period, all materials were returned to NES for final editing, scoring, and data processing.

Coding, Scoring, and Data Processing

All test booklets were subjected to an in-house edit at NES, including (1) a check on the coding of class, school, and district identification information; and (2) an edit for stray marks and double responses to the multiple-choice questions. The responses for each student were then keypunched and verified at the NES offices, and the cards were listed on a data tape for each grade level.

The data tape for each grade level contained one record for each student completing the test package. This record included: (1) information given by the student on the student questionnaire; (2) the student's responses to each of the exercises; and (3) an identification code which permitted the rematching of each student record to its original test document should that prove necessary.

Prior to data processing, the data tape was scanned for invalid entries and updated where necessary. All response data on the data tape were entered in raw score form and were converted to the percentage form as needed. Data reduction needs were determined and files were transformed where appropriate, including proper weighting of scores to provide estimates of the population from sample data. All student data (test scores and questionnaire data) were weighted.

Sampling Weights

To analyze the data for reporting purposes, sampling weights were applied to ensure that the results from students in each of the 24 categories of the sampling frame contributed in the proper proportion to the results for the population. For example, if 10% of the students in Connecticut reside in Smaller Places in the CREC Region, then 10% of the students in the sample should also be from that cell. If the sample were an exact microcosm of the population, there would be no need for sampling weights. In practice, however, this is rarely the case, due to a variety of factors such as different student attrition in different cells. Sampling weights based on actual student participation must be used to correct for disparities between the composition of the sample and that of the population.

In the example above, suppose that more than 10% of the students in the sample were from Smaller Places in the CREC Region. That cell would be overrepresented in the sample, and a relatively low sampling weight would have to be applied to ensure that the results of those students did not contribute disproportionately to the overall results. Conversely, a relatively high sampling weight would be necessary for cells which were underrepresented in the sample. The appropriate sampling weights were computed and applied for purposes of data analyses at each grade level based on the actual number of students who took the test.

The Local Option

The Local Option phase of the assessment allowed participating districts to examine in detail the achievement of their own students in a single class or throughout the district by contracting directly with NES. Results permitted local districts to (1) examine students, classes, schools, and the district as a whole; (2) examine special groups (e.g., male, female) utilizing precoding procedures provided by NES; and (3) compare local achievement results with results gathered in this year's statewide testing, the 1974-75 assessment results, and national results. Materials, as well as regional workshops in test administration and interpretation, were provided by CSDE through NES. Districts absorbed the costs of data processing only, on a per capita basis.

Thirty-three Connecticut school districts participated in the Local Option at one or more grade levels. Overall, 4,128 fourth-grade students, 4,593 eighth-grade students, and 5,425 eleventh-grade students were tested.

Local Option testing for a grade level was conducted in the same time period as the statewide sample testing of that grade level. Overlap of schedules facilitated the organization and execution of testing for both assessments and eliminated many activities for those statewide sampled schools that elected to participate in the Local Option.

The following services were provided by NES to those districts participating in the Local Option:

- training of test coordinators or administrators in test administration procedures at regional workshops for each grade level
- delivery of test booklets
- editing and scoring of tests and data analysis

- complete result reports as described below
- assistance with interpretation of results at regional workshops conducted after results had been returned to the districts for each grade level

Local Option participants were offered the option of purchasing one of two types of data analysis, Option I or Option II. Those districts selecting Option II received two copies of each result report listed below. Districts participating in Option I received two copies of each report listed below designated by asterisks.

For each student a:

(1) Student Objective Achievement Report
(2) Student Item Response Report

For each class a:

(1) Class Item Analysis Report
*(2) Class Objective Summary Report
*(3) Class Questionnaire Report

For each school a:

(1) School Item Analysis Report
*(2) School Objective Summary Report
*(3) School Questionnaire Report

For each district a:

(1) District Item Analysis Report
*(2) District Objective Summary Report
*(3) District Questionnaire Report

NES made every effort to ensure that the special needs of individual school districts were met wherever possible. Schools participating in the Local Option may compare their own results with results for the state and the respective groups as provided in this report.

CHAPTER 3

DATA ANALYSIS AND INTERPRETATION

Goals of the Data Analysis Plan

The goals of the data analysis plan, developed jointly by staff members of CSDE and NES, were to: (1) describe the achievement of students statewide at grade levels 4, 8, and 11; (2) describe the achievement of students in selected reporting groups and to compare their achievement with that of the students statewide; (3) compare the achievement of Connecticut students to student performance on the previous CAEP science assessment and to student performance in the Northeast and the nation; and (4) describe selected student characteristics. The major purpose of the data analysis plan was to ensure that the assessment results and reports provided information which could be interpreted and utilized by Connecticut educators, administrators, and the public-at-large in determining critical educational needs and in improving the educational system.

Data Analysis

All goals were accomplished by the selection of appropriate statistical analyses and proper weighting of scores. Achievement scores for all grade levels are reported in terms of the percentage of students responding correctly to a given item or in terms of the average percentage of a SET of items answered correctly. These percentage scores include:

(1) the percentage of individuals selecting each response for each item of the student questionnaire,

(2) the percentage of students answering correctly each item included on the test,

(3) the average percentage of items answered correctly within each goal area, and

(4) the average percentage of items answered correctly within each of the objectives matched to the goal areas. (Because the Grade 4 test was not as lengthy as the tests for Grades 8 and 11, it was considered inappropriate to analyze the Grade 4 test at the objective level because there were so few items per objective.)

Results of Connecticut students, as described above, are presented in this report for each grade level tested and for each reporting group selected by CSDE and the Advisory Committee. Where comparisons of performance are provided, statistical tests were carried out to determine the significance of the difference.

It should be emphasized that the results reported here indicate the average performance of students in Grades 4, 8, and 11 throughout Connecticut. No results for schools or school systems are included. Only individual local assessment could serve that purpose.

A Summary and Interpretations Report, which contains comments and recommendations based on the assessment results, has been sent to all superintendents and secondary school principals and is available from CSDE at its main or regional offices.

Interpretive Issues

The achievement scores presented in this report represent best estimates of the "true" achievement scores which would have been obtained had ALL students in the population, rather than a representative sample, been tested. Statistical techniques indicate that these estimates are most likely within two percentage points of the "true" scores of the population. If, for example, the statewide score for Grade 4 is shown as 61%, it would be safe to say that the "true" statewide score is between 59% and 63%. The purpose of this reminder is to caution the reader to refrain from overemphasizing small differences between scores.

The differences presented in this report which were statistically significant at the .05 level are indicated on the appropriate tables for each grade level. Statistical significance means that a difference of the given magnitude could be expected to occur in repeated samplings only five times in 100 if, in fact, there were no differences between groups. While these results very likely reflect the actual performance differences between groups, they should not be used to infer the causes of these differences. For example, it may be shown that students who live in Medium Cities perform above the state average, but this does not imply that this characteristic causes higher performance. The difference, or relationship, may in fact be "caused" by other, perhaps unknown, variables.

The percentage correct reported for the state as a whole and for the individual reporting groups are estimates based on probability samples, and, as such, have standard errors associated with them. The standard error is a statistical term which describes how close the sample score is likely to be to the "true" population score. The smaller the standard error, the greater the confidence we have that the true score is close to the observed sample score. The reported differences (effects) in performance between a given group and the state average are also estimates and have associated standard errors. The standard error of an effect depends on the size of the two samples, the percentage of each group answering the item correctly, and other stratification and clustering effects. Therefore, the magnitudes of the standard errors vary considerably from comparison to comparison. An effect that is twice the size of its associated standard error is considered significant at the .05 level. (The reader with a statistical background will recall that, for a simple t-test with a large number of observations, significance at the .05 level is obtained when the ratio of an effect to its standard error exceeds 1.96. Although the mathematics involved in computing the results described below are considerably more complicated, the basic concept is the same.)

It should be noted that some rather large effects are occasionally not statistically significant, while some rather small effects are in some instances significant. This is due to the fact that statistical significance is determined by the ratio of the effect to its standard error. The reader should therefore exercise caution in interpreting statistically significant differences. Statistical significance should not be equated with practical importance or educational meaningfulness. Just as acceptable levels of performance must be judged on the basis of educational expectations, the magnitude of differences observed between groups should similarly be judged not only on the basis of statistical significance but also on the basis of educational meaningfulness.

The reader should also be careful not to infer causality from the differences observed between the performance of Connecticut students and those in the nation and the Northeast region. The fact that Connecticut students surpassed the nation's or the Northeast region's students, or failed to perform as well, does not necessarily mean that Connecticut schools are causing the difference in performance. Community characteristics, family background, and personal characteristics of Connecticut students could bear a relationship to performance results.

The variables used in reporting the results were selected by CSDE on the basis of their conceptual importance. That is, it was considered tnat these variables, should they prove to bear a relationship to student achievement, would contribute important information to state- and local-level decision-makers in setting policy for the educational delivery system.

CHAPTER 4

1979-80 ACHIEVEMENT RESULTS

Introduction

To describe the achievement of Connecticut students in science, the assessment results include performance scores on each test item, objective, and goal area. Since the results are based on a representative sample, the achievement scores represent only best estimates of how well all Connecticut students would have scored. Statistical techniques indicate that these estimates are probably within two percentage points of the "true" scores of the population. Small differences between scores should not be overemphasized.

Comparisons of total test and goal area scores for the three grade levels should not be made except where noted in this report. It is possible, for example, that fourth-graders may have obtained a score indicating a higher percentage correct for the items administered at that grade level than eleventh-graders obtained on the items administered in Grade 11. However, this would not mean that fourth-graders outperformed the eleventh-graders. Comparisons among grade levels on total test results should not be made for the following reasons.

(1) The number of items administered at each grade level was different. Forty-five items were administered at Grade 4, 65 items administered for Grade 8, and 75 items administered to students in Grade 11.

(2) The set of items administered at each grade level was not identical. Although some items were repeated between grades, more than 60% of the items on each of the tests were unique to that specific grade level. Comparisons of achievement on repeated items are discussed later in this chapter.

(3) The level of difficulty of the items increased from Grade 4 to Grade 8 to Grade 11.

Achievement on the Total Test

Students in Grade 4 answered correctly an average of 61.3%, or 27.6, of the 45 test items on the test. In Grade 8, students answered correctly an average of 62.2%, or 40.4, of the 65 items on the test. Students in Grade 11 answered an average of 55.2%, or 41.4, of the 75 test items for Grade 11 correctly. Figure 4.1 presents student achievement on total test and goal areas for students in Grades 4, 8, and 11. Tables 4.2, 4.3, and 4.4 show the distribution of scores over decile ranges for Grades 4, 8, and 11, respectively.

Achievement on Goal Areas and Objectives

OVERVIEW. The test items for each grade level were matched to one of the seven objectives listed in the Overview; each objective was grouped with other objectives to define a broader goal area. It is therefore possible to examine not only results for individual items, but also results of all items matched to a particular objective (for Grades 8 and 11) and for all items matched to a particular goal area. Results for Grade 4 are reported for goal areas only, because some Grade 4 objectives contained only one or two items. The reliability of objective results calculated for such a small number of items is questionable.

ACHIEVEMENT IN GRADE 4. Of the 45 test items for Grade 4, Goals I, II, and III included 10, 20, and 15 items, respectively. Students' performance ranged between 52.0% correct for Goal II (Apply the fundamental principles of science) to 69.0% correct for Goal I (Know the fundamental facts and principles of science). Students answered correctly an average of 68.7% of the items for Goal III (Understand and apply the processes of science).

ACHIEVEMENT IN GRADE 8. For Grade 8, the number of items matched to Goals I, II, and III, was 22, 22, and 21, respectively. The average percentage of items answered correctly ranged from 56.9% for Goal II (Apply the fundamental principles of science) to 67.4% for Goal III (Understand and apply the processes of science). Students answered correctly 62.5% of the items matched to Goal I (Know the fundamental facts and principles of science).

Figure 4.5 shows student achievement on objectives for Grade 8. Of the 22 items included in Goal I, 11 items, 4 items, and 7 items were matched to Objectives 1, 2, and 3, respectively. Student performance on the objectives for Goal I ranged from 43.9% for Objective 2 (Know the fundamental facts and principles of physical science) to 69.2% for Objective 1 (Know the fundamental facts and principles of biological science).

FIGURE 4.1

Achievement on Total Test and Goal Areas by Grade Level

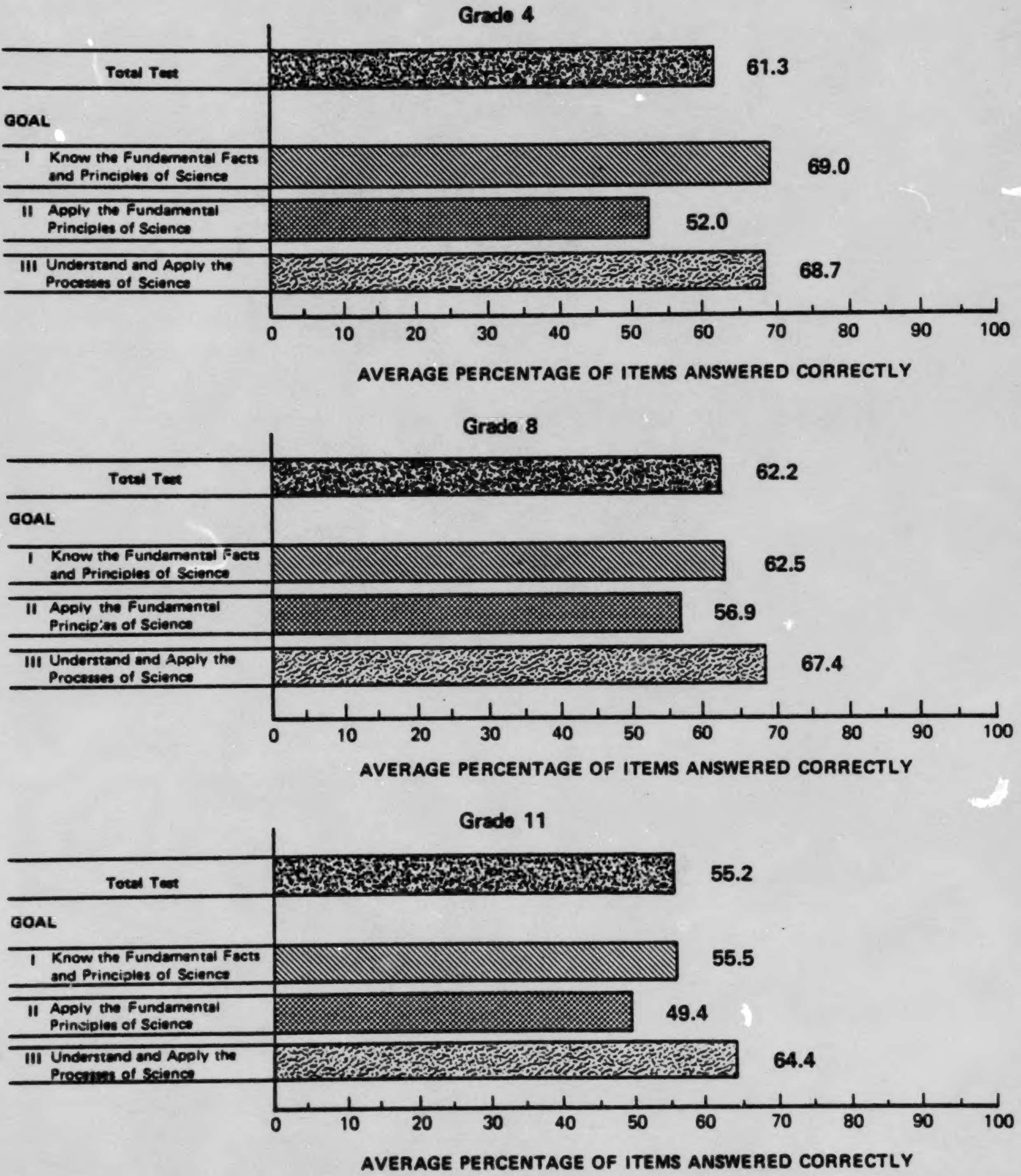


TABLE 4.2

Decile Distribution of Total Test Scores - Grade 4

Decile Range of Correct Responses	Percentage of Students with Scores in Each Decile Range
0-10%	0.1
11-20%	0.7
21-30%	2.5
31-40%	7.5
41-50%	11.5
51-60%	22.9
61-70%	22.0
71-80%	24.7
81-90%	6.8
91-100%	1.3

TABLE 4.3

Decile Distribution of Total Test Scores - Grade 8

Decile Range of Correct Responses	Percentage of Students with Scores in Each Decile Range
0-10%	0.0
11-20%	0.4
21-30%	1.9
31-40%	7.5
41-50%	13.1
51-60%	21.3
61-70%	22.0
71-80%	21.7
81-90%	10.3
91-100%	1.8

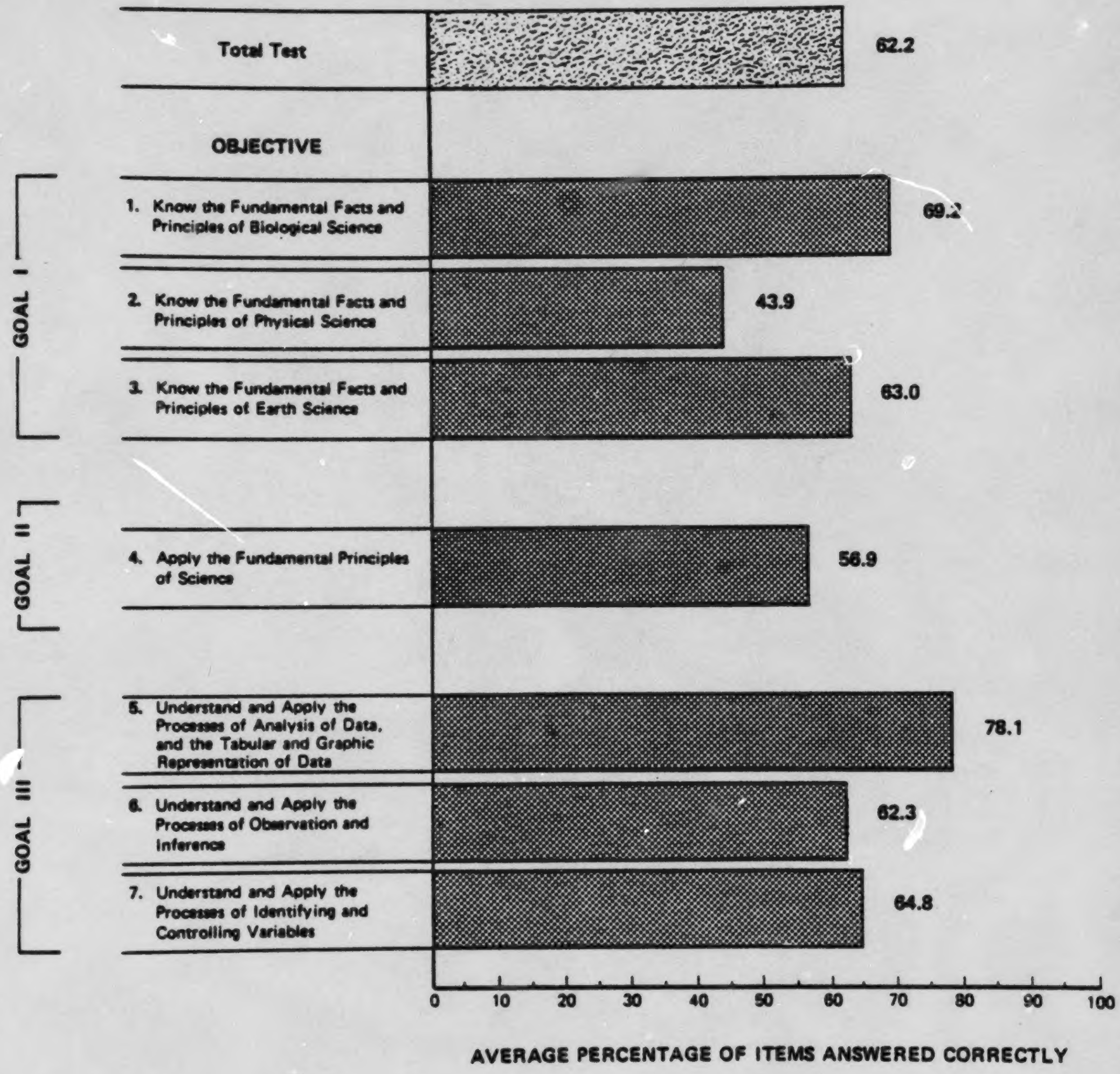
TABLE 4.4

Decile Distribution of Total Test Scores - Grade 11

Decile Range of Correct Responses	Percentage of Students with Scores in Each Decile Range
0-10%	0.0
11-20%	0.5
21-30%	4.7
31-40%	13.3
41-50%	19.2
51-60%	26.8
61-70%	17.0
71-80%	12.1
81-90%	5.4
91-100%	1.0

FIGURE 4.5

Achievement on Objectives for Grade 8



Since only Objective 4 was matched to Goal II, the objective score obtained by students is identical to the goal area score. Again, students answered correctly an average of 56.9% of the items correctly for Objective 4 in Goal II.

For the 21 items matched to Goal III, 6 items were included in Objective 5, 10 items matched to Objective 6, and 5 items included in Objective 7. Objectives scores ranged from 62.3% for Objective 6 (Understand and apply the processes of observation and inference) to 78.1% for Objective 5 (Understand and apply the processes of analysis of data, and the tabular and graphic representation of data).

ACHIEVEMENT IN GRADE 11. Of the 75 items included on the test for Grade 11, 27 items were matched to Goal I, 30 items matched to Goal II, and 18 items matched to Goal III. Student achievement on goal areas ranged from 49.4% for Goal II (Apply the fundamental principles of science) to 64.4% for Goal III (Understand and apply the processes of science) (see Figure 4.1). Students answered an average of 55.5% of the items correctly for Goal I (Know the fundamental facts and principles of science).

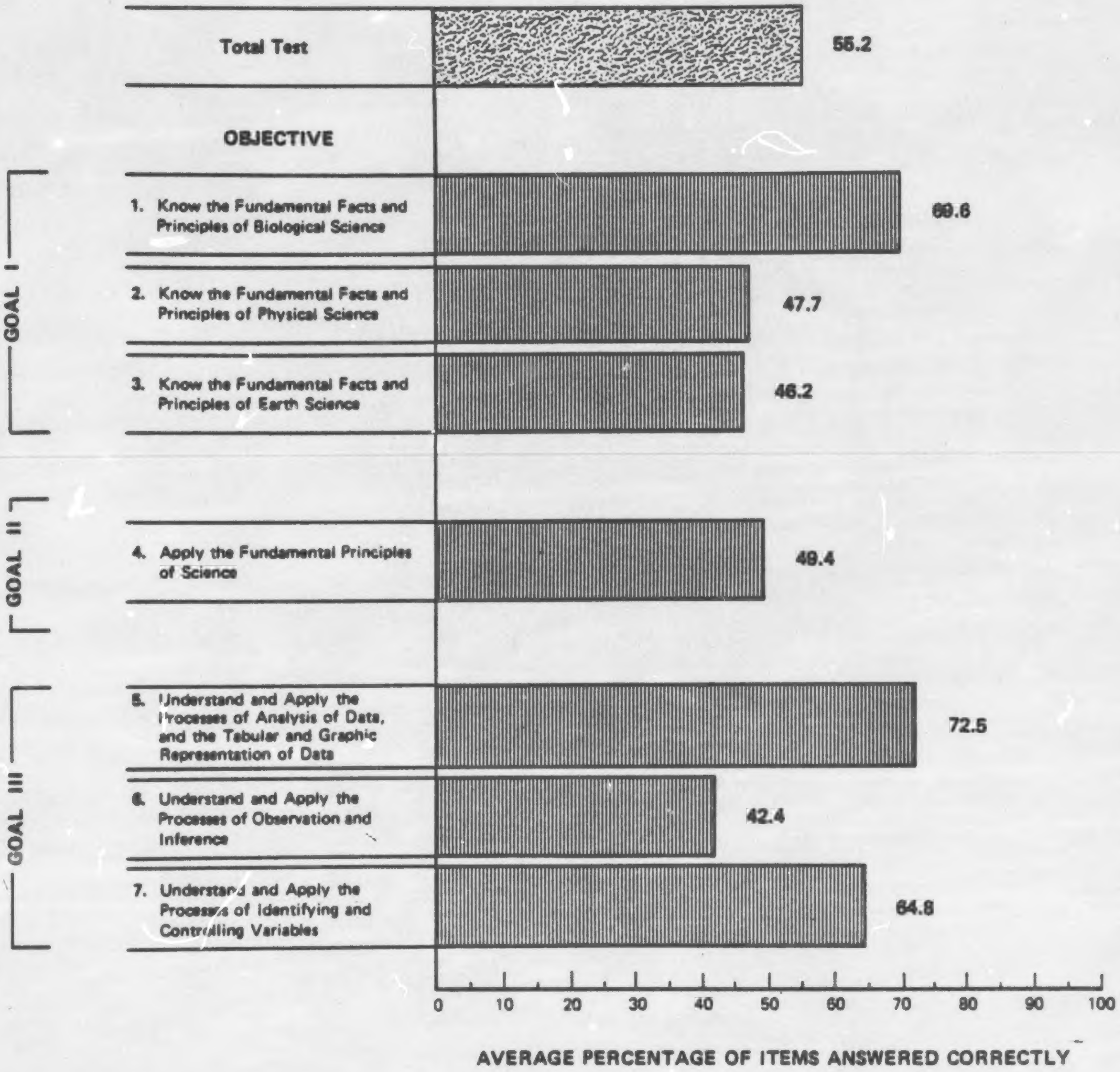
Figure 4.6 illustrates student objective achievement for Grade 11. Of the 27 items included in Goal I, 10 items, 11 items, and 6 items were matched to Objectives 1, 2, and 3, respectively. Achievement scores for these objectives ranged from 46.2% (Objective 3) to 69.6% (Objective 1).

As in Grade 8, the only objective included in Goal II for the Grade 11 test was Objective 4. On the average, students answered 49.4% of the items correctly for this objective/goal.

Objectives 5, 6, and 7 were matched to Goal III and consisted of 11 items, 4 items, and 3 items, respectively. Objective achievement scores ranged from 42.4% (Objective 6) to 72.5% (Objective 5).

FIGURE 4.6

Achievement on Objectives for Grade 11



Achievement on Items Across Age Groups

Appendix A of this report contains copies of the test instruments for each grade level. For each item, the percentage of students selecting each response alternative is presented, with the correct response denoted by an asterisk.

For comparison purposes, a number of items were selected for each test that were administered at more than one grade level. Ten identical items appeared on the tests for fourth- and eighth-graders; fifteen items were included on both the eighth- and eleventh-grade tests. One of these items was repeated for all three grade levels.

Table 4.7 shows the percentage of students answering correctly each of the items repeated across grade levels. For the 10 items common to Grades 4 and 8, students answered correctly an average of 52.5% of the items in Grade 4 and 74.2% of the items in Grade 8. For every item included on the two test instruments, student performance increased significantly (by at least five percentage points) at the Grade 8 level. Increase in student performance ranged from 5.3 to 41.3 percentage points which resulted in an average increase from Grade 4 to Grade 8 of 21.7 percentage points.

For the 15 items common to the tests for Grade 8 and Grade 11, the average student gain from Grade 8 to Grade 11 was 10.2 percentage points. Eighth-graders answered correctly 62.5% of these items whereas eleventh-graders answered correctly 72.7% of these items. All but three items (Items 3, 38, 57) showed a significant increase in achievement (a gain of at least five percentage points) from Grade 8 to Grade 11.

Item 38 was the item administered at all three grade levels which required students to predict the weight of a solution made up of one kilogram of salt and twenty kilograms of water. The percentage of students answering this item correctly was 50.8%, 56.1%, and 49.0% for Grades 4, 8, and 11, respectively. Students in Grade 8 outperformed students in both Grades 4 and 11 on this item. The older students were more likely to select the response which stated that the weight of the resultant mixture was unpredictable.

TABLE 4.7

Comparison of Achievement Across Grade Levels on Common Items by Goal Area

1979-80 CAEP Item Number	Percentage of Students Answering Correctly		
	Grade 4	Grade 8	Grade 11
Goal 1			
1		68.7	80.2
2		69.6	78.3
3		80.1	82.6 †
4		89.6	95.3
8	59.9	76.7	
9	71.5	84.6	
11	85.1	90.7	
20		31.6	44.1
Goal 2			
14	32.2	73.5	
24	47.7	71.1	
31	9.9	49.6	
36		70.2	79.2
37	59.4	74.5	
38	50.8	56.1	49.0
39		26.5	40.5
41	64.3	88.1	
Goal 3			
28		53.8	71.2
29	44.2	77.4	
35		25.0	48.7
49		58.2	74.4
51		52.3	70.9
56		72.2	86.3
57		93.5	94.3 †
58		90.1	95.5
Average score for 10 items common to Grades 4 & 8	52.5	74.2	
Average score for 15 items common to Grades 8 & 11		62.5	72.7

† indicates a nonsignificant difference between scores of Grade 8 and Grade 11 students

CHAPTER 5

COMPARING CONNECTICUT WITH THE NATION AND THE NORTHEAST REGION

Introduction

In order to put into perspective the achievement of Connecticut students, results presented here compare Connecticut students with students in the nation and the Northeast region. These students had been tested as part of the National Assessment of Educational Progress (NAEP), which has assessed student performance in science in 1969-70, 1972-73, and 1976-77. All items included in this year's assessment were selected from the pool of items available from NAEP. Comparisons were made for individual items and for sets of items grouped by objectives, by goal area, and by total test at each grade level.

Interpretation of Results

Certain differences existed between the Connecticut and NAEP assessments that bear on the interpretation of results. First, no paced audiotapes were used for test administration in Connecticut; NAEP uses paced audiotapes for test directions and for every item.

Secondly, NAEP tests students at each age level regardless of the grade in which they are enrolled, while Connecticut tested 9-, 13-, and 17-year-olds enrolled only in Grades 4, 8, and 11, respectively. Thus, even though most 9-year-olds are in the fourth grade, some are in the third or fifth grades, and there are similar relationships between 13-year-olds and eighth-graders, and 17-year-olds and eleventh-graders. This discrepancy between the Connecticut and NAEP sampling methodology exists at all three age/grade levels, and presents a potential problem for any comparative analysis. In order to obviate this problem, NAEP recently began to report achievement results for students of the proper age within each grade level. These so-called "modal" data insure that comparisons are being performed between, for example, 9-year-old fourth-graders in

Connecticut and 9-year-old fourth-graders in the nation. The comparisons reported below use the NAEP modal data wherever possible. However, for items from the two earlier NAEP science assessments, only age data are available for comparative purposes.

The third interpretation issue which should be considered involves the passage of time between the NAEP and CAEP assessments. As reported above, NAEP science assessments have occurred in 1969-70, 1972-73, and 1976-77. We are thus comparing 1979-80 statewide data to nationwide data which are from three to ten years old. This would not be an issue if scores were expected to remain constant from year to year. However, NAEP has reported a consistent decline in scores for those science items that have been administered in each assessment. This decline in scores has been most substantial at the higher grade levels. Thus, it is likely that the NAEP scores used for comparison purposes in this report are higher than scores which would have been obtained had NAEP performed a concurrent assessment in 1979-80. Thus, Connecticut has been placed in a comparative disadvantage due to the passage of time. The NAEP results used for comparison purposes in this report were in all cases the most recent data available for each item.

Summary of Results

Comparisons of statewide to nationwide results were performed at the item, objective, goal, and total test levels. Discussion in the narrative below focuses first upon the two more general levels, and then upon individual item comparisons.

COMPARISONS WITH THE NATION. Although each of the items on the CAEP tests were administered by NAEP, the group of items which constitute a test or a goal were not administered nationally at any one time to any one group of students. Therefore, there are no NAEP group statistics which permit statistical tests to be performed comparing Connecticut with NAEP performance at the goal or total test level. However, average performance of the two groups may still be compared. Figures 5.1, 5.2, and 5.3 illustrate average performance of Connecticut fourth-, eighth-, and eleventh-graders on total test and goal areas as compared to the nation.

Connecticut fourth-graders outscored their national counterparts by 1.7 percentage points in terms of the average percentage of all test items answered correctly. Performance by Connecticut fourth-grade students was better than the nation for 16, or 36%, of the test items, about the same as the nation for 23, or 51%, of the items, and below the nation for 6, or 13%, of the items. In addition, average goal scores for Connecticut fourth-graders were greater than those obtained by students nationwide by from 0.2 to 2.3 percentage points.

Average achievement by eighth-graders in Connecticut was about the same as the nation on total test and goal areas. Students in Connecticut answered correctly an average of 62.2% of the items while students nationwide answered 61.9% of the items correctly. This small difference in total test achievement is maintained in the goal area comparisons. On the three goal areas, Connecticut students scored from 0.7 percentage points below to 1.2 percentage points above students in the nation. Connecticut eighth-graders outperformed the nation on 20, or 31%, of the 65 test items, performed about the same as the nation on 31, or 48%, of the items, and below the nation on 14, or 22%, of the items.

Average achievement on the 75 test items administered to Connecticut eleventh-graders was about the same as the achievement for the national sample on these items. Connecticut students were able to answer correctly an average of 55.2% of the test items as compared to 56.8% answered correctly by students nationwide. In all, average student scores in Grade 11 were above the nation for 14, or 19%, of the items, about the same as the nation for 35, or 47%, of the items, and below the nation for 26, or 35%, of the items. However, performance of students in Grade 11 on Goal I was below the average achievement of the nation's 17-year-olds for this goal area by 3.1 percentage points. Scores for eleventh-graders on Goals II and III averaged within 2 percentage points of the national scores.

COMPARISONS WITH THE NORTHEAST. In the Northeast region, NAEP includes Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Washington, D.C., Pennsylvania, and Maryland. For Connecticut students in Grade 4, the average achievement on the total test was about the same as the achievement scores of their counterparts in the Northeast region (see Figure 5.1). The average score obtained by Connecticut students was 3.1 percentage points below the score for Northeast students on Goal I. On Goals II and III, scores for the two groups were about the same.

Performance by Connecticut students in Grade 8 was 2.1 percentage points below the performance of students in the Northeast on the total test. Figure 5.2 shows that this lower average achievement score for Connecticut students is due mostly to the lower average goal score obtained by Connecticut eighth-graders in Goal I. Students in Grade 8 performed about the same as their Northeast counterparts on Goals II and III.

As in Grade 8, Connecticut students in Grade 11 were outscored by their counterparts in the Northeast (see Figure 5.3). Students in Connecticut scored an average of 4.1 percentage points below 17-year-olds in the Northeast. Scores obtained by students in Grade 11 were lower than the Northeast for Goals I and II, by 5.8 and 3.8 percentage points, respectively. Connecticut students scored at about the same level as students in the Northeast for Goal III.

COMPARISONS BY ITEMS AND OBJECTIVES. Tables 5.4, 5.5, and 5.6 compare Connecticut performance on items to performance in the nation and Northeast for Grades 4, 8, and 11, respectively. For each test item at each grade level, the average percentage of students answering correctly is shown for the three comparison groups. In addition, summary scores by objective, goal, and item also appear on these tables. The scores indicated for national and Northeast performance are the data for the most recent NAEP administration of each item, and are grade modal data except where only age data was available from NAEP.

FIGURE 5.1

Comparing Connecticut, the Nation, and the Northeast by Total Test and Goal Areas

Grade 4

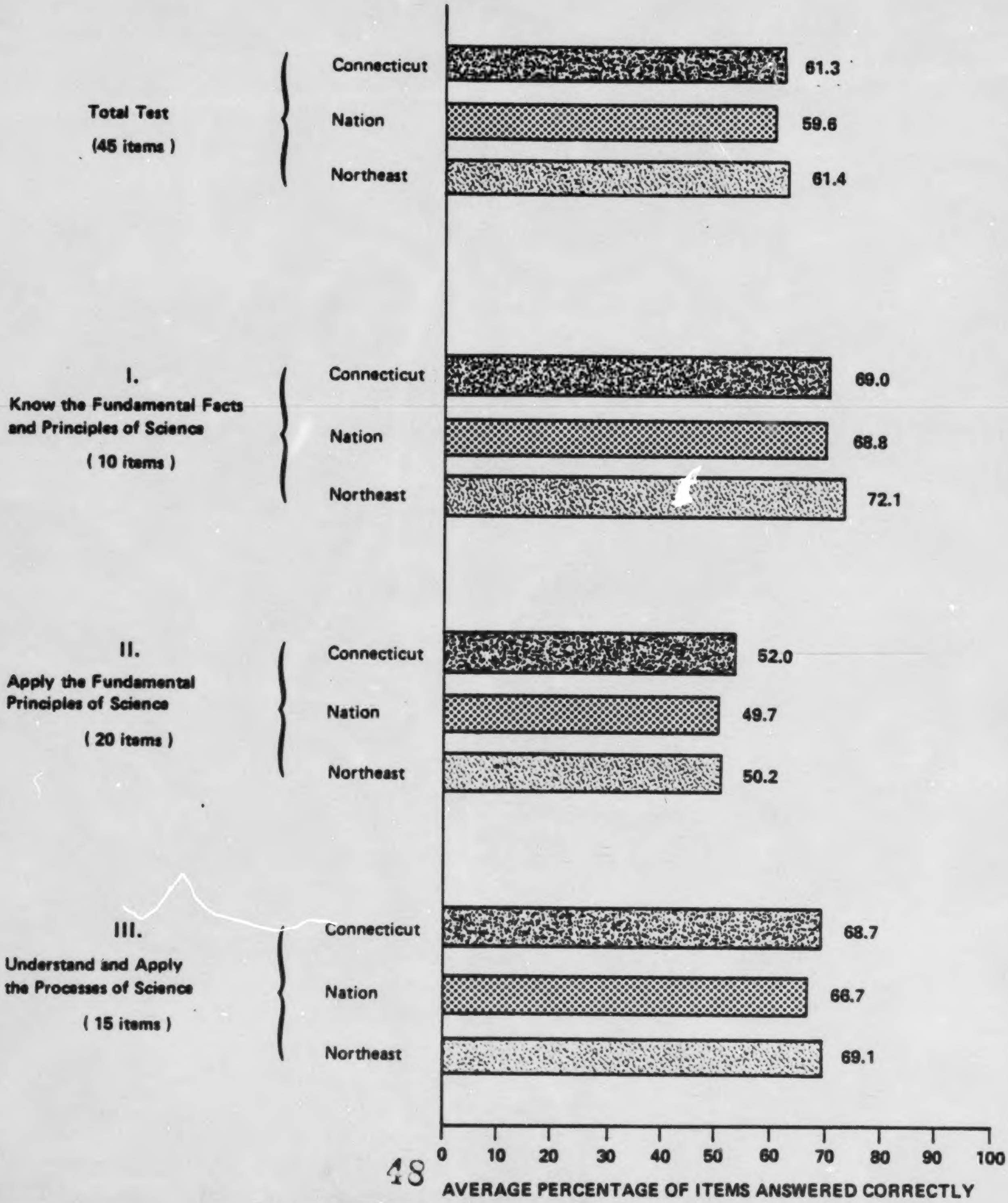


FIGURE 5.2

Comparing Connecticut, the Nation, and the Northeast by Total Test and Goal Areas

Grade 8

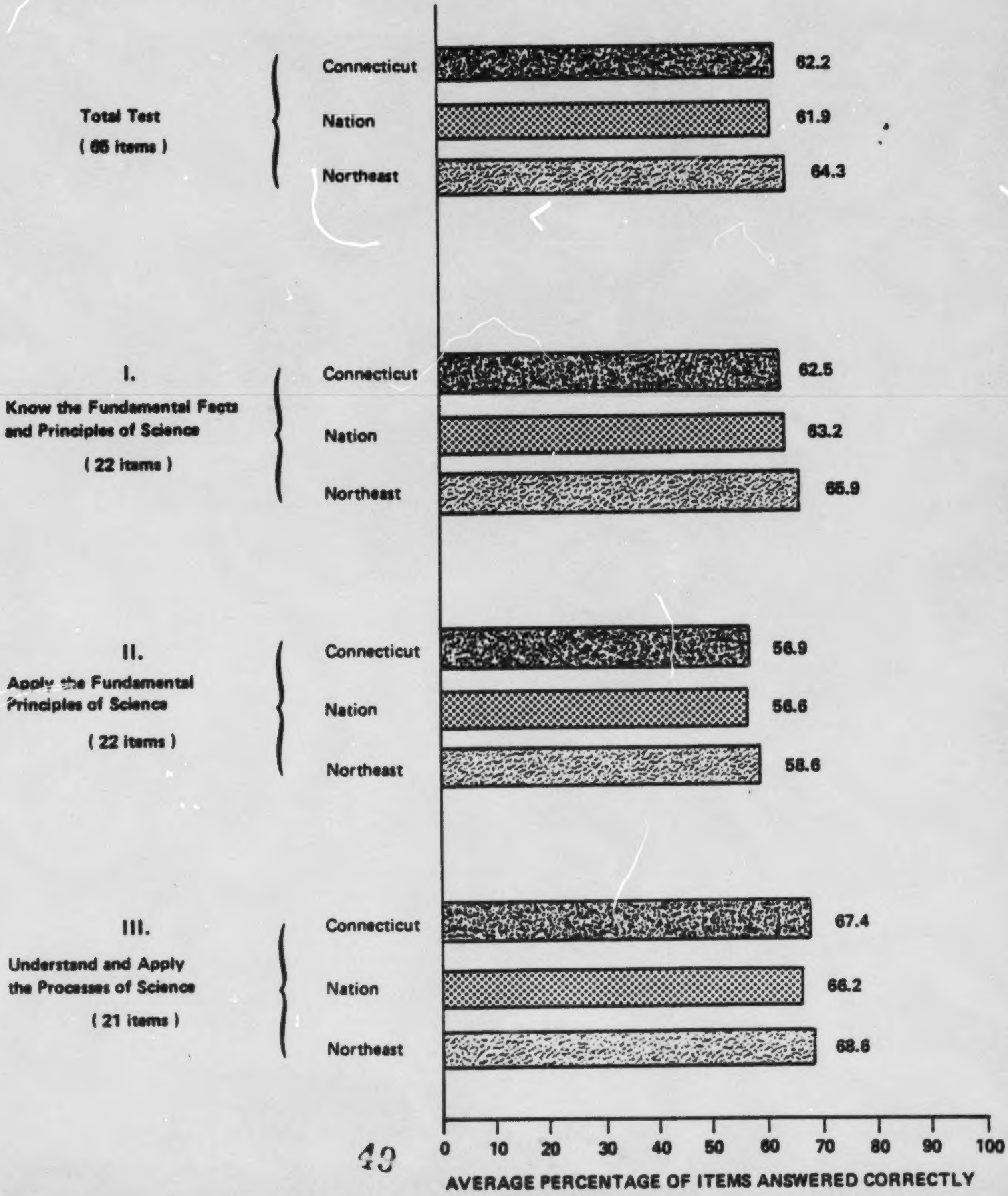


FIGURE 5.3

Comparing Connecticut, the Nation, and the Northeast by Total Test and Goal Areas

Grade 11

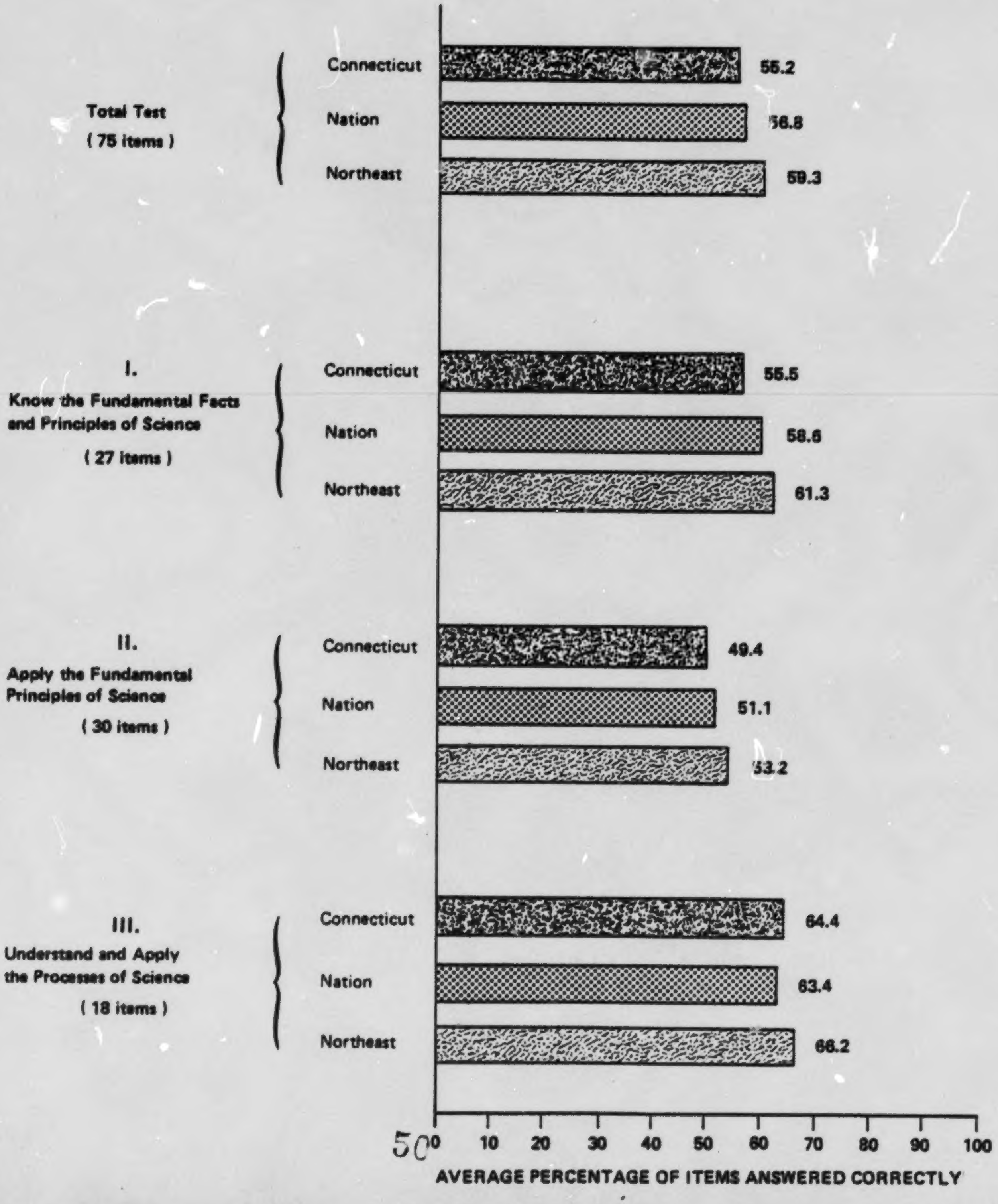


TABLE 5.4

Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast

GRADE 4

1979-80 CAEP Item Number	Percent Correct 1979 CAEP (Modal)	Percent Correct NAEP National (Modal)	Percent Correct NAEP Northeast (Modal)
Goal I (10 items)	*69.0*	*68.8*	*72.1*
1	94.6	92.6	93.3
2	81.4	83.3 †	88.7 †
3	45.2	49.6	54.1
4	74.2	79.6 †	83.7 †
6	67.5	55.1 †	66.1 †
8	59.9	59.7	59.9
9	71.5	74.3	74.8
11	85.1	88.7 †	87.8 †
25	36.0	38.9 †	43.0 †
26	77.1	66.3 †	69.7 †
Goal II (20 items)	*52.0*	*49.7*	*50.2*
5	61.7	61.9 †	58.4 †
7	83.7	83.0 †	81.6 †
12	92.6	89.9 †	91.4 †
13	17.8	18.3	17.1
14	32.2	30.7	31.6
15	21.9	24.4 †	23.5 †
16	78.2	70.2 †	73.7 †
18	85.2	87.4	90.5
19	38.4	45.5	45.9
24	47.7	40.8 †	42.8 †
27	46.0	48.6 †	51.7 †
28	70.4	67.3 †	71.2 †
30	76.4	70.2 †	68.6 †

† No modal data was available for these items

TABLE 5.4 (continued)

Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast

GRADE 4

1979-80 CAEP Item Number	Percent Correct 1979 CAEP (Modal)	Percent Correct NAEP National (Modal)	Percent Correct NAEP Northeast (Modal)
Goal II (cont.)			
31	9.9	5.6	5.6
34	12.2	13.4	13.5
35	41.7	45.4	44.9
37	59.4	52.1	55.7
38	50.8	39.0	35.2
40	50.4	40.3	40.1
41	64.3	60.1	61.5
Goal III (15 items)	*68.7*	*66.7*	*69.1*
10	72.9	58.6 †	65.4 †
17	66.7	66.4 †	72.5 †
20	61.2	68.6 †	67.8 †
21	73.4	71.9	71.2
22	71.1	63.0	69.3
23	77.9	82.7 †	85.1 †
29	44.2	39.4 †	38.5 †
32	74.3	66.9 †	72.5 †
33	72.5	68.5	72.9
36	64.9	61.7 †	59.7 †
39	91.4	89.6	91.5
42	56.8	56.0 †	57.8 †
43	92.3	91.4 †	92.6 †
44	36.5	47.4	49.6
45	76.3	68.9	70.9
Total (45 items)	*61.3*	*59.6*	*61.4*

TABLE 5.5

Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast

GRADE 8

1979-80 CAEP Item Number	Percent Correct 1979 CAEP (Modal)	Percent Correct NAEP National (Modal)	Percent Correct NAEP Northeast (Modal)
Goal I (22 items)	*62.5*	*63.2*	*65.9*
Objective 1 (11 items)	69.2	67.6	69.8
1	68.7	70.0	72.1
2	69.6	59.9	58.3
3	80.1	73.7	76.0
4	89.6	79.2	77.7
5	81.4	78.2 †	80.8 †
6	84.2	84.2 †	87.3 †
42	76.8	64.9	67.1
60	66.1	68.4 †	73.6 †
61	56.6	62.0 †	65.1 †
62	46.3	52.8	56.8
64	40.2	50.7	53.4
Objective 2 (4 items)	43.9	47.2	50.7
12	44.2	50.9 †	56.9 †
46	60.3	54.9	63.3
47	35.6	34.8 †	37.0 †
55	35.4	48.4 †	45.5 †
Objective 3 (7 items)	63.0	65.3	68.5
7	55.4	76.1	79.1
8	76.7	76.7	81.6
9	84.6	73.4	77.6
10	44.8	50.3 †	54.4 †
11	90.7	92.6 †	92.1 †
20	31.6	30.1	32.2
53	57.4	57.8	62.8

† Modal data was not available for these items

TABLE 5.5 (continued)

Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast

GRADE 8

1979-80 CAEP Item Number	Percent Correct 1979 CAEP (Modal)	Percent Correct NAEP National (Modal)	Percent Correct NAEP Northeast (Modal)
Goal II (22 items)	56.9	56.6	58.6
Objective 4			
13	53.0	55.5	60.3
14	73.5	75.0	73.0
15	20.1	27.4 +	27.0 +
16	31.5	32.9 +	25.5 +
17	39.4	39.1 +	42.4 +
22	64.1	57.4 +	62.6 +
23	27.1	40.7 +	42.9 +
24	71.1	62.3 +	60.6 +
25	66.7	72.6 +	71.0 +
26	43.6	40.8	36.1
30	56.2	61.1 +	63.6 +
31	49.6	46.2	55.3
33	63.1	54.9 +	60.4 +
36	70.2	73.5	75.5
37	74.5	75.7	76.1
38	56.1	37.1	41.0
39	26.5	30.1	35.4
40	73.2	61.0	68.2
41	88.1	83.7	83.3
43	87.7	93.2	93.9
52	79.0	70.8 +	80.1 +
59	37.3	55.2	55.3

TABLE 5.5 (continued)

Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast

GRADE 8

1979-80 CAEP Item Number	Percent Correct 1979 CAEP (Modal)	Percent Correct NAEP National (Modal)	Percent Correct NAEP Northeast (Modal)
Goal III (21 items)	*67.4*	*66.2*	*68.6*
Objective 5 (6 items)	78.1	75.1	77.6
27	63.2	60.7 †	67.4 †
28	53.8	45.4	51.5
44	95.9	93.5	94.7
56	72.2	76.1	77.2
57	93.6	92.2	93.1
58	90.1	82.7	81.9
Objective 6	62.3	61.0	63.7
18	62.7	66.0	72.5
19	55.0	51.3	54.5
21	85.3	83.0 †	82.9 †
29	77.4	72.6 †	76.7 †
32	75.3	67.5	67.0
34	29.7	28.7	38.1
35	25.0	28.4	29.1
45	70.0	70.0 †	71.7 †
54	48.3	48.3	48.9
65	94.5	94.7	95.5
Objective 7 (5 items)	64.8	65.9	67.5
48	60.8	56.4 †	62.7 †
49	58.2	68.8 †	65.0 †
50	73.8	68.0	73.1
51	52.3	48.3	49.1
63	79.0	87.9	87.7
Total (65 items)	*62.2*	*61.9*	*64.3*

TABLE 5.6

Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast

GRADE 11

1979-80 CAEP Item Number	Percent Correct 1979 CAEP (Modal)	Percent Correct NAEP National (Modal)	Percent Correct NAEP Northeast (Modal)
Goal I (27 items)	55.5	58.6	61.3
Objective 1 (10 items)	69.6	69.8	71.8
1	80.2	83.8	83.9
2	78.3	68.9	69.8
3	82.6	82.0	84.8
4	95.3	91.7	95.7
5	77.6	83.0	89.8
6	40.5	40.7 †	43.1 †
8	66.7	71.0 †	72.7 †
9	55.9	54.1	55.0
11	54.1	57.1 †	56.0 †
68	65.0	66.0 †	66.9 †
Objective 2 (11 items)	47.7	52.5	54.5
12	61.9	64.4	62.0
15	80.5	76.6	83.4
16	57.5	63.7 †	71.8 †
17	54.5	50.7 †	57.1 †
22	33.8	30.3	32.1
62	46.6	54.6 †	50.7 †
63	47.0	47.1 †	43.8 †
66	20.5	34.5 †	44.5 †
67	44.8	65.2 †	61.5 †
73	21.4	31.2	32.1
74	57.2	58.9 †	60.9 †

† Modal data was not available for these items

TABLE 5.6 (continued)

Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast

GRADE 11

1979-80 CAEP Item Number	Percent Correct 1979 CAEP (Modal)	Percent Correct NAEP National (Modal)	Percent Correct NAEP Northeast (Modal)
Objective 3 (6 items)	46.2	51.2	56.4
18	27.7	27.5 †	26.5 †
20	44.1	38.6	42.1
21	49.7	68.1 †	75.0 †
23	47.0	52.6	60.7
37	55.6	52.5	60.1
75	53.3	68.0 †	74.3 †
Goal II (30 items)	*49.4*	*51.1*	*53.2*
Objective 4			
7	96.2	97.2 †	98.1 †
10	83.4	79.8 †	85.4 †
13	19.7	20.5 †	20.9 †
14	28.5	29.9 †	32.0 †
19	36.5	35.3	36.9
24	29.9	24.7	24.0
25	44.2	51.1 †	50.0 †
26	39.4	35.0 †	44.8 †
29	58.0	56.9 †	58.7 †
30	66.5	64.0	62.5
31	57.3	62.1	62.7
32	95.3	96.6	96.5
33	52.6	46.8	48.8
34	69.1	74.5	76.7
36	79.2	87.2	90.7

TABLE 5.6 (continued)

Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast

GRADE 11

1979-80 CAEP Item Number	Percent Correct 1979 CAEP (Modal)	Percent Correct NAEP National (Modal)	Percent Correct NAEP Northeast (Modal)
Objective 4 (cont.)			
38	49.0	44.8	50.5
39	40.5	43.6	49.9
42	20.0	22.1	29.9
43	90.5	92.2 †	82.3 †
44	44.0	36.5	38.4
52	35.9	37.2	36.1
54	40.8	51.6 †	58.6 †
55	29.8	28.1	32.8
60	26.6	22.7 †	21.8 †
61	44.7	51.6 †	56.6 †
64	18.2	23.7 †	23.4 †
65	42.2	48.5 †	48.9 †
69	47.0	56.0 †	57.6 †
71	46.6	56.1	61.3
72	49.7	56.0	58.6
Goal III (18 items)	*64.4*	*63.4*	*66.2*
Objective 5 (11 items)	72.5	71.3	73.4
27	76.8	80.0 †	80.0 †
28	71.2	72.6	73.4
40	29.7	34.4	41.8
45	77.4	74.7	76.1
46	86.7	85.3	86.3
47	68.7	61.4	66.7

TABLE 5.6 (continued)

Comparison of Achievement on Individual Items for Connecticut Students versus the Nation and the Northeast

GRADE 11

1979-80 CAEP Item Number	Percent Correct 1979 CAEP (Modal)	Percent Correct NAEP National (Modal)	Percent Correct NAEP Northeast (Modal)
Objective 5 (cont.)			
50	40.6	31.9	33.4
56	86.3	86.7	86.3
57	94.3	96.5	97.6
58	95.5	89.1	87.6
70	68.4	72.1	78.0
Objective 6 (4 items)	42.4	42.3	46.9
35	48.7	54.4	62.1
48	15.3	17.8 †	23.4 †
53	71.4	65.8 †	69.4 †
59	34.7	31.4	32.8
Objective 7 (3 items)	64.8	62.6	65.9
41	49.5	50.4	56.8
49	74.4	72.0 †	74.4 †
51	70.9	65.3	66.4
Total (75 items)	55.2	56.8	59.3

CHAPTER 6

COMPARISONS OF THE 1979-80 ACHIEVEMENT RESULTS WITH THE 1974-75 RESULTS

Introduction

Because Connecticut had conducted a science assessment in 1974-75, year-to-year achievement comparisons are possible for items administered in both assessments. Approximately 50% of the items for the 1979-80 administration were selected from the previous assessment. This resulted in the selection of 23 items for Grade 4, 32 items for Grade 8, and 38 items for Grade 11 from the 1974-75 assessment.

The results described here are for those items repeated for both the CAEP 1974-75 and CAEP 1979-80 science assessments. The narrative below will focus on goal and total test achievement comparisons.

Interpretive Issues

As indicated in the previous chapter, results for CAEP 1979-80 are reported in terms of grade modal data. The previous CAEP science assessment collected and reported data following the NAEP model of testing students by age regardless of grade. This difference in testing methodology may have affected the following results. As described in the previous chapter, scores obtained in successive assessments conducted by NAEP have declined from the 1969-70 to the 1976-77 administrations, this decline being most substantial at the 17-year-old level. It is possible that the lower performance scores obtained in the CAEP 1979-80 administration as compared to CAEP 1974-75 may be partially attributed to a general trend reflected in the NAEP assessments. This issue was discussed previously in the introduction to Chapter 5. Small differences between the item scores for comparison groups are not likely to be educationally meaningful.

Achievement Comparisons

Achievement scores for total test and goal areas computed for those items administered in both the 1974-75 and 1979-80 CAEP assessments may be found in Figures 6.1, 6.2, and 6.3. As indicated in these figures, average performance scores at each grade level have declined from the previous assessment by 3.3 to 4.9 percentage points.

Individual item comparisons are shown in Tables 6.4, 6.5, and 6.6 for Grades 4, 8, and 11, respectively. Of the 23 items common to the Grade 4 tests in CAEP 1979-80 and CAEP 1974-75, students participating in the 1974-75 assessment answered correctly an average of 71.4% of the items. In the CAEP 1979-80 administration, students correctly answered an average of 68.1% of these items. The greatest decline in scores occurred for Goal III (Understand and apply the processes of science). For the 10 items repeated in this goal area, students in the 1974-75 CAEP assessment outperformed students in 1979-80 CAEP by an average of 5.9 percentage points (see Table 6.4).

For Grade 8, students in the CAEP 1974-75 administration outperformed students in the present assessment by 4.2 percentage points. Students in CAEP 1974-75 answered correctly an average of 61.9% of the items compared to 57.7% answered correctly by students in CAEP 1979-80. This decline is most evident in the achievement scores obtained by students this year on Goal II. Students' scores in this goal area declined by an average of 5.9 percentage points from the previous assessment (57.3% versus 51.4%). At the objective level, a significant decline in scores occurred between the two assessment years for Objective 3 (Know the fundamental facts and principles of earth science). For the three repeated items in this objective, students in CAEP 1979-80 scored an average of 5.3 percentage points lower than students in CAEP 1974-75 (see Table 6.5).

For Grade 11, the average decline in scores from CAEP 1974-75 to CAEP 1979-80 was 4.9 percentage points. On the average, students in the 1974-75 administration answered correctly 55.9% of the 38 repeated items while students participating in this year's assessment answered correctly 51.0% of these items.

The greatest decline in scores for Grade 11 occurred in Goal I. Goal I scores for students this year averaged 5.5 percentage points below the goal scores obtained by students in the previous assessment. Decline in objective scores for this goal area ranged from 5 percentage points (Objective 2) to 10.2 percentage points (Objective 3) below the previous assessment's objective scores.

Students in CAEP 1979-80 also scored below their 1974-75 counterparts for Goal II by an average of 5.3 percentage points. By comparison, Goal III scores for repeated items in the two assessment years were about the same. The average score for Goal III in 1979-80 was only 1.7 percentage points below that of the 1974-75 participants (see Table 6.6).

FIGURE 6.1

Year-to-Year Comparisons for Repeated Items

Grade 4

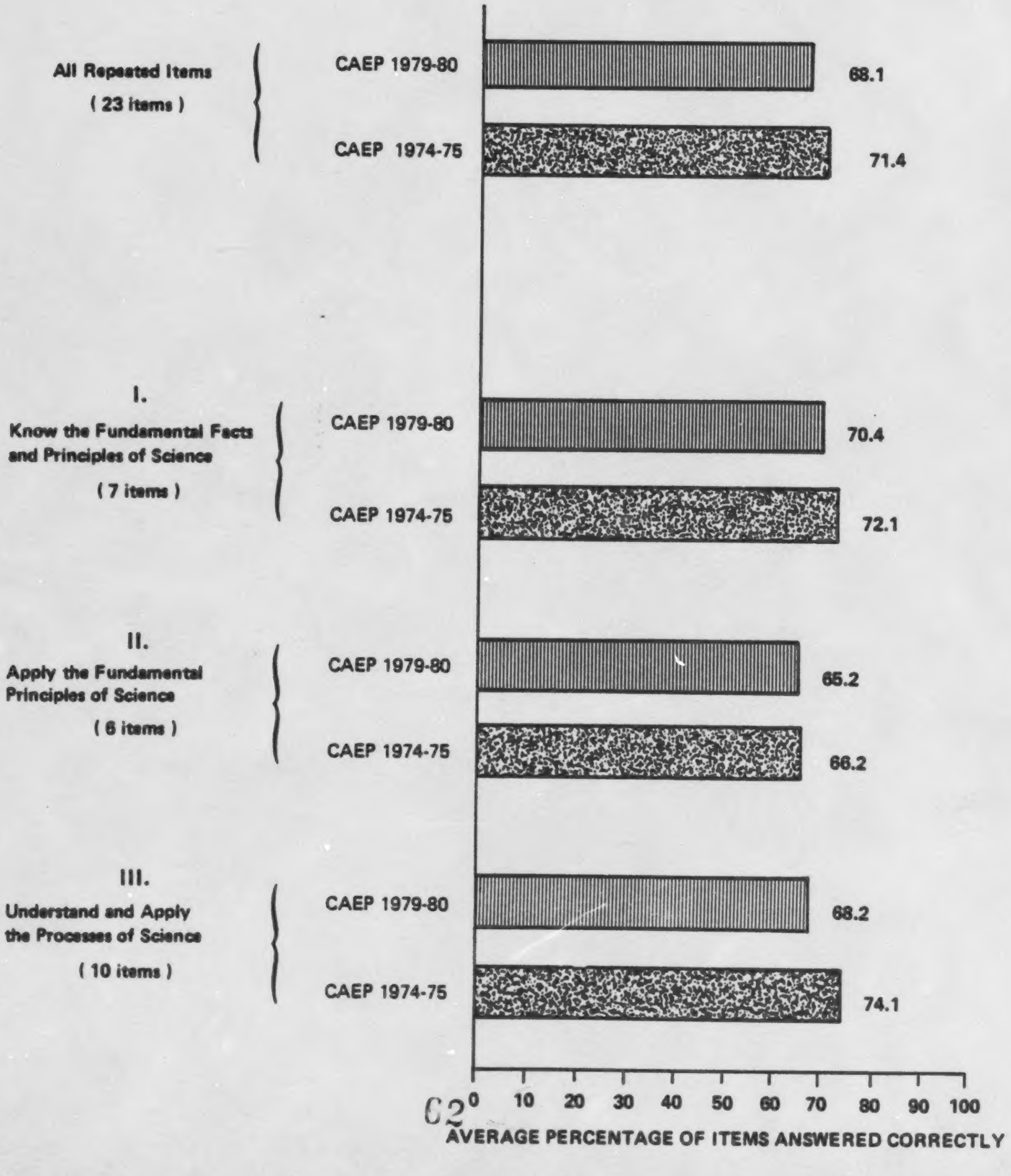


FIGURE 6.2

Year-to-Year Comparisons for Repeated Items

Grade 8

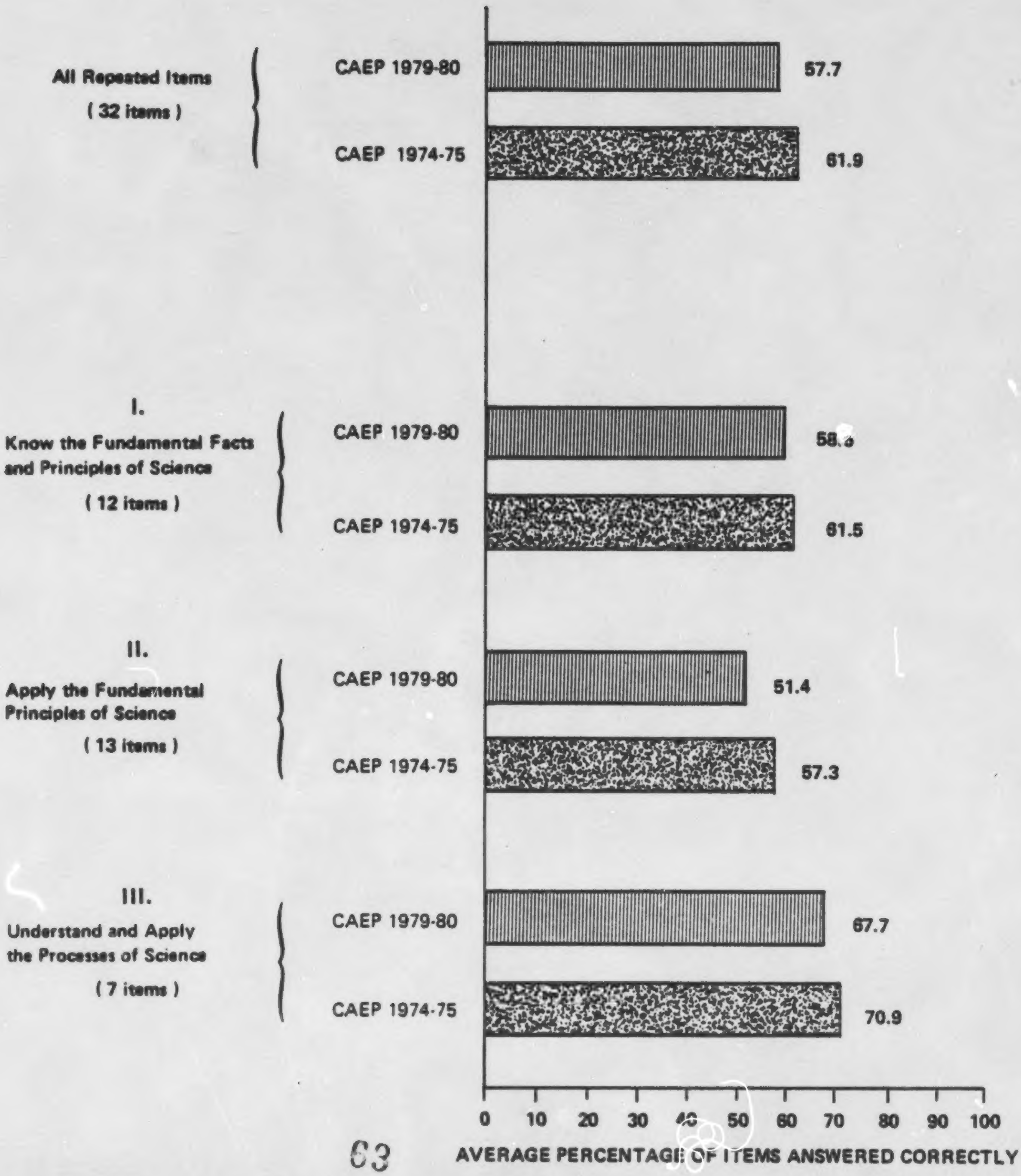


FIGURE 6.3

Year-to-Year Comparisons for Repeated Items

Grade 11

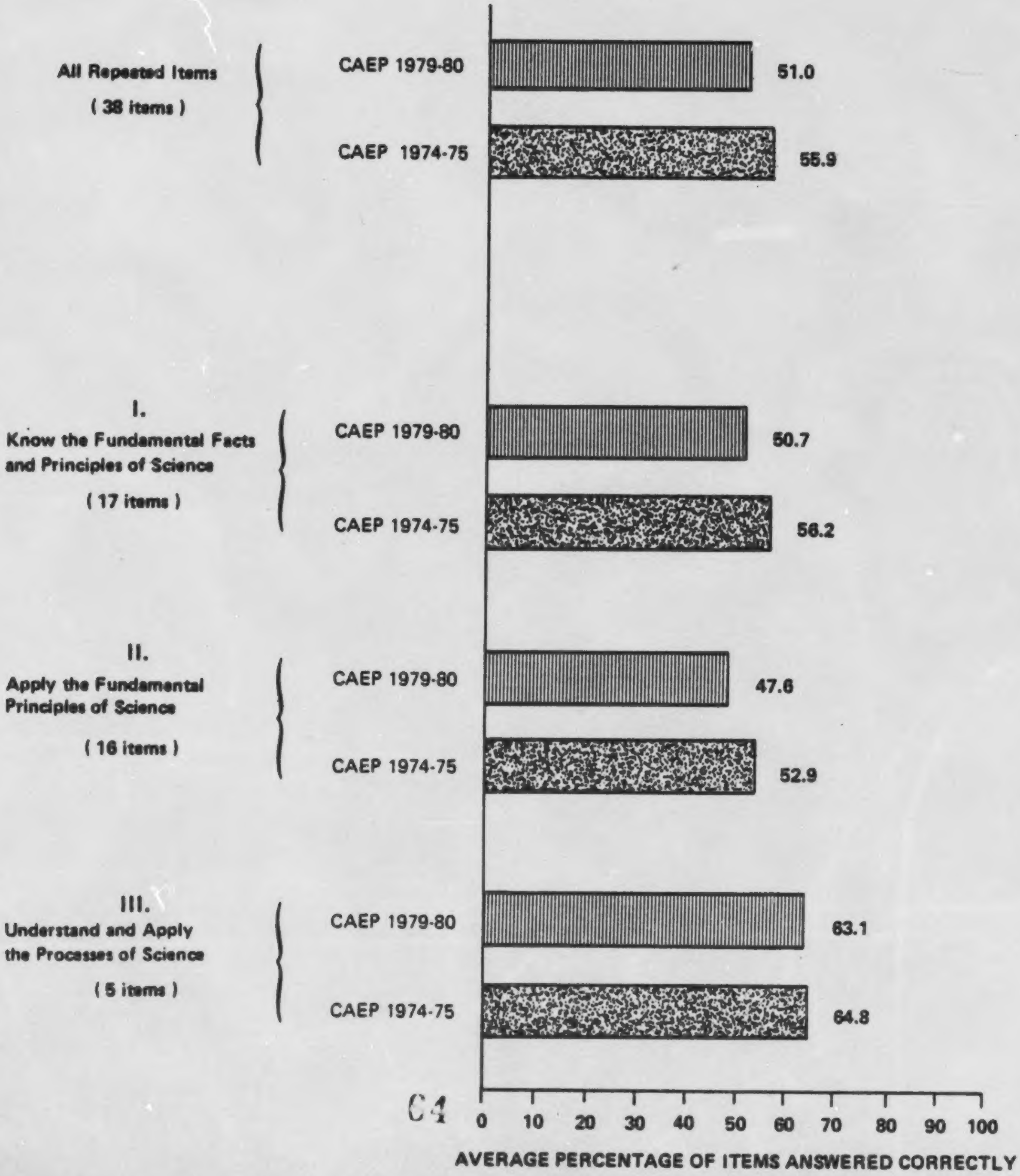


TABLE 6.4

Year-to-Year Comparisons of Achievement on Individual Items

GRADE 4

1979-80 CAEP Item Number	1974-75 CAEP Item Number	Percent Correct 1979-80	Percent Correct 1974-75
Goal I (7 items)		*70.4*	*72.1*
2	7	81.4	87.6
4	2	74.2	82.7
6	33	67.5	62.1
9	23	71.5	75.1
11	17	85.1	89.0
25	6	36.0	34.0
26	21	77.1	74.5
Goal II (6 items)		*65.2*	*66.2*
7	41	83.7	78.2
12	42	92.6	91.6
15	31	21.9	32.8
27	20	46.0	51.4
28	36	70.4	65.5
30	35	76.4	77.7
Goal III (10 items)		*68.2*	*74.1*
10	43	72.9	71.9
17	32	66.7	75.7
20	18	61.2	76.8
22	19	71.1	73.8
23	30	77.9	85.8
29	26	44.2	47.2
32	34	74.3	70.9
36	5	64.9	74.2
42	9	56.8	70.0
43	11	92.3	94.8
TOTAL (23 items)		68.1	71.4

TABLE 6.5

Year-to-Year Comparisons of Achievement on Individual Items

GRADE 8

1979-80 CAEP Item Number	1974-75 CAEP Item Number	Percent Correct 1979-80	Percent Correct 1974-75
Goal I (12 items)		*58.6*	*61.5*
Objective 1 (5 items)		66.9	71.0
5	12	81.4	77.5
6	5	84.2	90.5
60	18	66.1	72.4
61	49	56.6	58.1
62	63	46.3	56.5
Objective 2 (4 items)		43.9	43.6
12	29	44.2	45.6
46	51	60.3	47.0
47	34	35.6	38.5
55	40	35.4	43.2
Objective 3 (3 items)		64.3	69.6
10	58	44.8	54.6
11	1	90.7	94.5
53	54	57.4	59.7
Goal II (13 items)		*51.4*	*57.3*
Objective 4			
13	32	53.0	55.2
15	45	20.1	31.3
16	16	31.5	39.5
17	22	39.4	44.0
22	10	64.1	71.9
23	21	27.1	36.9
25	15	66.7	69.0
26	47	43.6	49.5

TABLE 6.5 (continued)

Year-to-Year Comparisons of Achievement on Individual Items

GRADE 8

1979-80 CAEP Item Number	1974-75 CAEP Item Number	Percent Correct 1979-80	Percent Correct 1974-75
Goal II			
Objective 4 (cont.)			
30	19	56.2	67.6
33	14	63.1	60.0
43	9	87.7	92.5
52	7	79.0	84.4
59	57	37.3	43.5
Goal III (7 items)		67.7	70.9
Objective 5 (1 item)			
27	37	63.2	63.7
Objective 6 (3 items)		72.6	76.1
19	44	55.0	60.1
21	23	85.3	87.6
29	2	77.4	80.6
Objective 7 (3 items)		64.3	68.2
48	59	60.8	63.9
49	36	58.2	68.9
50	13	73.8	71.8
TOTAL (32 items)		57.7	61.9

TABLE 6.6

Year-to-Year Comparisons of Achievement on Individual Items

GRADE 11

1979-80 CAEP Item Number	1974-75 CAEP Item Number	Percent Correct 1979-80	Percent Correct 1974-75
Goal I (17 items)		*50.7*	*56.2*
Objective 1 (4 items)		56.6	62.1
6	55	40.5	38.8
8	5	66.7	75.7
11	58	54.1	62.2
68	22	65.0	71.9
Objective 2 (10 items)		50.4	54.5
12	60	61.9	65.0
15	19	80.5	88.6
16	54	57.5	61.7
17	36	54.5	47.1
22	48	33.8	30.0
62	37	46.6	45.1
63	52	47.0	56.6
66	69	20.5	27.7
67	28	44.8	59.3
74	64	57.2	64.2
Objective 3 (3 items)		43.6	53.8
18	38	27.7	29.8
21	14	49.7	63.2
75	43	53.3	68.5
Goal II (16 items)		*47.6*	*52.9*
Objective 4			
7	73	96.2	96.7
10	3	83.4	88.9
13	17	19.7	25.8
14	49	28.5	27.1

TABLE 6.6 (continued)

Year-to-Year Comparisons of Achievement on Individual Items

GRADE 11

1979-80 CAEP Item Number	1974-75 CAEP Item Number	Percent Correct 1979-80	Percent Correct 1974-75
Objective 4 (cont.)			
25	41	44.2	54.4
26	44	39.4	46.4
29	47	58.0	65.4
43	46	90.5	92.7
52	42	35.9	39.3
54	45	40.8	49.2
60	59	26.6	23.5
61	23	44.7	54.2
64	12	18.2	22.4
65	34	42.2	44.8
69	32	47.0	57.6
71	72	46.6	58.0
Goal III (5 items)		*63.1*	*64.8*
Objective 5 (2 items)		77.1	78.0
27	40	76.8	79.6
45	66	77.4	76.4
Objective 6 (2 items)		43.3	46.1
48	56	15.3	17.8
53	51	71.4	74.4
Objective 7 (1 item)			
49	16	74.4	7[illegible].0
TOTAL (38 items)		51.0	55.9

CHAPTER 7

COMPARING TOTAL TEST ACHIEVEMENT BY SIZE OF COMMUNITY AND REGION OF THE STATE

Introduction

The purpose of this section is to describe and compare the achievement of selected groups of students within Connecticut. The selected groups are defined on the basis of the two stratification variables discussed in Chapter 1: size of community and region of the state. Achievement is defined as performance on the total test, that is, the average percentage of all items on the test answered correctly.

The average for each size-of-community group is compared to the statewide average for all students at the appropriate grade level. Asterisks indicate those differences in scores that are statistically significant. However, statistical significance is not to be equated with educational meaningfulness. Small differences between groups may be statistically significant in one case and not in another due to a variety of factors, such as differing sample sizes. However, even where statistically significant, differences may be too small to be educationally meaningful. What is educationally meaningful depends on judgments about the practical implications of given differences in scores.

Further, observed differences do not indicate cause-effect relationships. The differences observed reveal only a relationship between a given factor and achievement, not that the factor causes differences in achievement.

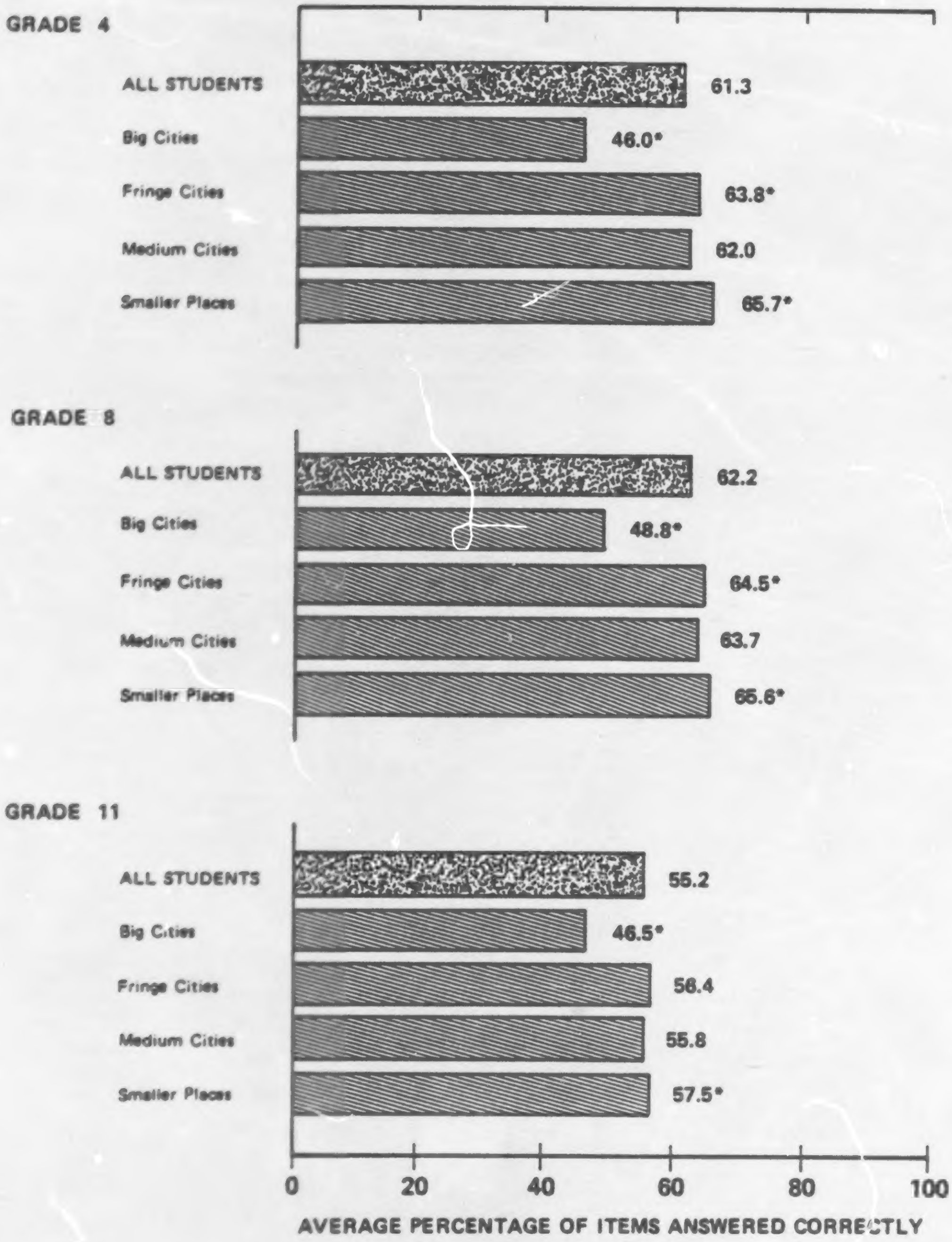
Summary of Results for Stratification Variables

SIZE OF COMMUNITY. Figure 7.1 displays the results by size of community. Scores of students in Smaller Places for all grades and students in Fringe Cities for Grades 4 and 8 exceeded the statewide average by 2 to 4 percentage points. In accordance with the findings of previous assessments, performance of students who reside in "Big Cities" was substantially lower than that of students statewide. This difference was most pronounced at the fourth-grade level, where Big-City residents scored 15 percentage points below the statewide average. The difference was still substantial at the higher grade levels, where Big-City students scored about 13 and 9 percentage points below the statewide average for Grades 8 and 11, respectively.

REGION OF THE STATE. Figure 7.2 displays the results by region of the state. In order to make fair comparisons among the scores for the six regions of the state, the scores of students who live in big cities were not included when computing regional averages. Because there are no big cities in three of the regions, and because the scores of Big-City students tend to differ from those of other students, it was felt that in this assessment (as in previous Connecticut assessments) comparisons among the regions should be made for non-Big-City students only. Figure 7.2 shows the average scores for non-Big-City students in each region, as well as the average score for all non-Big-City students and for all students. At all grade levels, average total test scores for the non-Big-City students in each of the regions tended to be quite close.

FIGURE 7.1

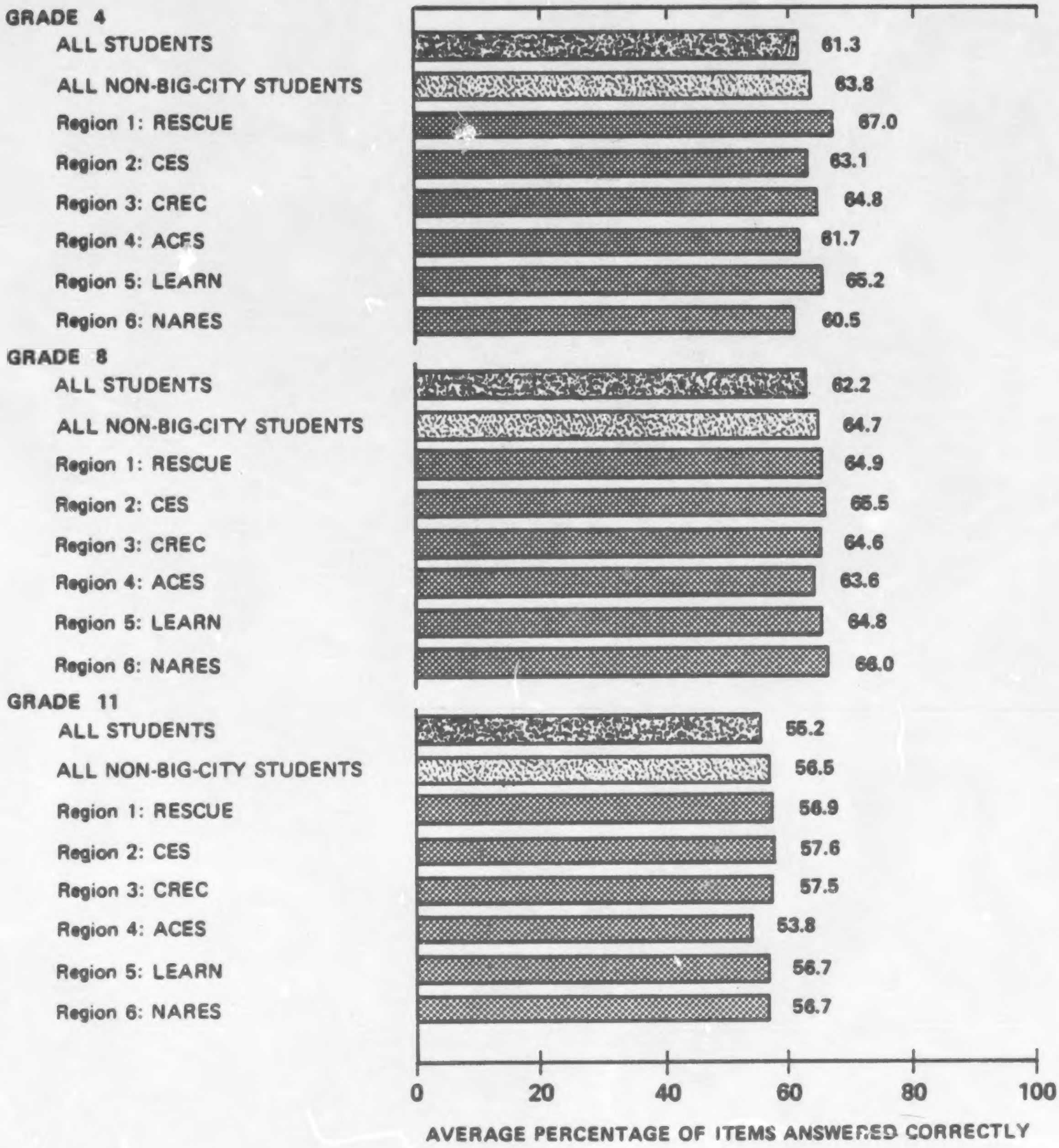
Achievement on Total Test by Size of Community



* Represents statistically significant difference between size of community and statewide average.

FIGURE 7.2

Achievement on Total Test by Region Excluding Big City Students



NOTES: (1) Summary results are shown in two ways– first for all students and then for all students except those who reside in Big Cities. (2) Results by region do not include Big Cities because the scores of Big-City students tend to differ from those of students in their respective regions, according to information from previous assessments in Connecticut.

CHAPTER 8

RESULTS OF THE STUDENT QUESTIONNAIRE

Introduction

There are two ways in which student questionnaire results may be used. First, students can be grouped on the basis of their questionnaire responses, and the test achievement of the resulting "reporting groups" may then be compared (i.e., an "achievement analysis"). Second, an examination of the responses may, in itself, provide a policy-relevant characterization of students and student attitudes regarding science education throughout Connecticut (i.e., a "survey analysis"). In the first part of this chapter, those student questionnaire variables which were found to bear a relationship to achievement are discussed. For each of these variables, both achievement and survey data are presented. In the next part of the chapter, additional student questionnaire variables are discussed in terms of survey data only.

For the interested reader, the breakdown of achievement by total test and by goal for all reporting groups is presented in Appendix C. These results will not be discussed here. The statistics presented in Appendix C for each dependent variable are defined as follows: (1) the P-VALUE for each reporting group is the estimated percentage of students in the reporting group answering correctly; (2) the SE OF P-VALUE is the standard error of measurement for the reporting group; (3) the GROUP EFFECT is the difference between the state p-value and that for the reporting group; (4) the SE OF EFFECT is the standard error of measurement of the group effect; (5) the RATIO OF 3 TO 4 is the ratio of the GROUP EFFECT to the SE OF EFFECT (a test of statistical significance); (6) an asterisk (*) means that the GROUP EFFECT is significant at the 95% confidence level; and (7) the SAMPLE SIZE is the actual number of students tested in the reporting group.

Summary of Results for Student Questionnaire Reporting Variables

The average percentage of test items answered correctly was computed for each student group. In each case, the average total test score for the group is compared to the average score for all students at that grade level within Connecticut.

Table 8.1 presents the average performance for each of the selected reporting groups. The narrative in this section will focus on those differences which were statistically significant. On the accompanying table, these statistically significant differences are indicated by asterisks. The cautionary statements, presented in the previous chapter regarding statistical significance, educational meaningfulness, and cause-effect relationships, apply to these findings as well.

TABLE 8.1

Achievement by Student Questionnaire Reporting Groups

Reporting Group	Average Percentage of Items on the Total Test Answered Correctly		
	Grade 4	Grade 8	Grade 11
ALL STUDENTS STATEWIDE	61	62	55
1. Are you a			
boy?	63 *	65 *	60 *
girl?	60 *	60 *	51 *
2. How do you feel about science compared to the other things you study in school?			
Science is my least favorite.	55 *	53 *	45 *
Science is not one of my favorites.	60 *	61	52 *
Science is one of my favorites.	64 *	64 *	61 *
Science is my favorite.	58 *	63	67 *
3. Do you think science will make life better for you and your family?			
Yes	62 *	--	--
No	58 *	--	--
4. How valuable do you feel the study of science and technology is to society?			
Useless	--	50 *	41 *
Not very valuable	--	51 *	44 *
Valuable	--	60 *	52 *
Very valuable	--	67 *	59 *

* represents statistically significant difference between group and statewide average

NOTE: Questionnaire items have been renumbered for this table. These item numbers DO NOT correspond with the original item numbers.

TABLE 8.1 (continued)

Achievement by Student Questionnaire Reporting Groups

Reporting Group	Average Percentage of Items on the Total Test Answered Correctly		
	Grade 4	Grade 8	Grade 11
ALL STUDENTS STATEWIDE	61	62	55
5. How valuable do you feel your science courses will be to you after you have finished high school?			
Useless	--	--	45 *
Not very valuable	--	--	50 *
Valuable	--	--	58 *
Very valuable	--	--	64 *
6. When was the last time you had a science course?			
Two years ago or longer	--	--	40 *
Last year	--	--	48 *
I am taking one or more this year.	--	--	61 *
7. Class discussions of science topics			
I like class discussions of science topics very much.	61	65 *	60 *
Class discussions of science topics are okay.	62 *	61 *	55
I do not like class discussions of science topics.	57 *	57 *	48 *
8. Actually doing laboratory experiments			
I like to do experiments very much.	62 *	63 *	57 *
Doing experiments is okay.	55 *	58 *	53 *
I do not like to do experiments.	57	51 *	48 *

* represents statistically significant difference between group and statewide average

TABLE 8.1 (continued)

Achievement by Student Questionnaire Reporting Groups

Reporting Group	Average Percentage of Items on the Total Test Answered Correctly		
	Grade 4	Grade 8	Grade 11
ALL STUDENTS STATEWIDE	61	62	55
9. How many times EACH WEEK do you study science?			
Never	54 *	--	--
Once a week	59 *	--	--
Twice a week	64 *	--	--
Three times a week	65 *	--	--
Four times a week	62	--	--
10. In your science class, how much of the time do you actually spend on activities such as working with plants and animals, using chemicals, or performing experiments?			
Never or hardly ever	--	56 *	--
Once or twice a month	--	62	--
Once or twice a week	--	64 *	--
Just about every day	--	63	--
11. In your science classes, how much of the time do you actually spend on activities such as gathering data, conducting experiments, or using science equipment?			
Never or hardly ever	--	--	46 *
Once or twice a month	--	--	54 *
Once or twice a week	--	--	59 *
Just about every day	--	--	54

* represents statistically significant difference between group and statewide average

TABLE 8.1 (continued)

Achievement by Student Questionnaire Reporting Groups

Reporting Group	Average Percentage of Items on the Total Test Answered Correctly		
	Grade 4	Grade 8	Grade 11
ALL STUDENTS STATEWIDE	61	62	55
12. Do you have a hobby at home connected with any of the things you study in science?			
Yes	62	64 *	59 *
No	61	61 *	54 *
13. How much do you enjoy watching a show about science on television or visiting a science museum?			
I like these very much.	63 *	67 *	63 *
I think these are okay.	61	61 *	54 *
I don't like these.	52 *	58 *	48 *

* represents statistically significant difference between group and statewide average

1. SEX OF STUDENT. At all grade levels, males outperformed females. However, this difference was more pronounced at the upper grade levels, ranging from approximately 3 percentage points at Grade 4 to 5 percentage points at Grade 8 to 9 percentage points at Grade 11.

   In Grades 4 and 8, 46% of the students in the sample were male, while 54% were female. In Grade 11, 48% of the students were male and 52% female.

2. ATTITUDE TOWARD SCIENCE. At the eleventh-grade level, students who indicated that science was their "least favorite" subject scored about 10 percentage points below the statewide average, while those who said it was their "favorite" subject outscored the statewide average by 12 percentage points. The same relationship was found at the eighth-grade level although the differences between groups were smaller. In Grade 4, students who claimed that science was their "favorite" subject scored 3 percentage points below the statewide average, while fourth-graders who said that science was "one of their favorite" subjects scored 3 percentage points above the statewide average.

   Students' reported attitude toward science was generally more favorable at the lower grade levels. About 70% of the fourth-graders, 60% of the eighth-graders, and 45% of the eleventh-graders reported that science was either "one of their favorite" subjects or their "favorite" subject.

VALUATION OF SCIENCE.

3. Value to family life: Students in Grade 4 who indicated that they felt science would make life better for themselves and their families scored an average of 4 percentage points higher than students who did not believe this to be true. Only 12% of the fourth-graders responded negatively to this item.

4. Value to society: Students in Grades 8 and 11 were asked a similar question regarding the study of science and its value to society. In general, achievement scores at both grade levels were higher when valuation of science was more positive. The average scores of students who considered the study of science to be "very valuable" exceeded the statewide average by 4 to 5 percentage points.

Achievement scores for all other categories of response were below the statewide average by from 2 to 3 percentage points (for students who said the study of science was "valuable") to as much as 12 to 14 percentage points (for students who said the study of science was "useless").

Fewer than 10% of the students in the eighth and eleventh grades indicated that they felt the study of science to be "not very valuable" or "useless." Of the remaining students about 41% and 53% of the students in Grades 8 and 11, respectively, chose the "very valuable" response to this question.

5. Value to student: Generally, achievement scores were higher when student perceptions of the value of science courses taken in school were more positive. Performance of students in Grade 11 who felt that science courses taken in school would be "very valuable" after graduation exceeded the statewide average by 9 percentage points, while the average score of students who saw these courses as "useless" was below the statewide score by approximately the same amount.

   Although only 7% of the students considered their science courses to be "useless," about as many students considered these courses to be "not very valuable" (36%) as considered the courses to be "valuable" (39%). The percentage of students choosing the "very valuable" response was 18%.

6. Most recent enrollment in a science course: Students who reported that they were presently taking a science course scored 6 percentage points above the statewide average. By contrast, those students who were last enrolled in a science course one year ago performed 7 percentage points below the state; achievement was 15 percentage points below the state for students whose most recent enrollment in a science course was two years previous to testing.

   More than half of the students (59%) reported that they were presently taking a science course. Only 7% of the students said that they were last enrolled in a science course two years ago or longer.

CLASSROOM SCIENCE ACTIVITIES.

7. Class discussion of science topics: Students in all grades who responded that they did not like class discussion of science topics performed significantly below the statewide average by from 4 to 7 percentage points. Students in Grades 8 and 11 who enjoyed class discussions performed better than the statewide average.

   For each grade level, more students chose the response indicating that class discussions were "okay" than any other response category for this item (50%, 62%, and 60% for Grades 4, 8, and 11, respectively). While 42% of the fourth-graders liked class discussions of science activities, 29% of the eighth-graders and 26% of the eleventh-graders reported enjoying this activity.

8. Actually doing laboratory experiments: For all grade levels, those students who indicated that they liked doing laboratory experiments scored slightly above the statewide average, by from 1 to 2 percentage points. The achievement scores of students who either felt this activity was "okay" or "did not like" doing experiments ranged from two to eleven percentage points below the statewide average.

   At each grade level, most students indicated that they enjoyed doing laboratory experiments. The percentage of students indicating that they enjoyed this activity ranged from 85% for Grade 4 to 77% for Grade 8 to 57% for Grade 11. Fewer than 7% of the students at any grade level indicated that they did not enjoy performing experiments.

9. Time spent on science, fourth-graders: The performance of Grade 4 students who reported that they studied science two to three times a week was up to 4 percentage points above the statewide average. By contrast, students who indicated that they either studied once a week or never studied science averaged 2 to 7 percentage points below the state. Students who indicated that they studied science four times a week or more performed at about the statewide average.

   Less than 9% of the students responded that they never studied science. The percentage of students included in the other response categories ranged from 18% to 26%.

10. and 11. Time spent on science activities, Grades 8 and 11: Students at both upper grade levels who "never or hardly ever" spent time on science activities scored as much as 9 percentage points below the statewide average, while students who spent time on science activities "once or twice a week" averaged at least two percentage points above the statewide scores. Student performance averaged about the same as the state if time was spent on these science activities "daily."

About one-third of the students at each grade level said that they actually worked with science materials once a month or less often. About twice as many eighth-graders (24%) as eleventh-graders (13%) reported engaging in this type of activity on a daily basis.

EXTRA-CURRICULAR SCIENCE ACTIVITIES.

12. Science hobbies: In Grades 8 and 11, students who indicated that they had a science hobby outperformed the statewide average by 2 to 4 percentage points; this difference was larger at the upper grade level. Students who did not have a science hobby at these two grade levels scored about 1 percentage point below the statewide average. No difference in achievement scores was found for Grade 4 on this variable.

Approximately half of the students in Grade 4 indicated that they had a science hobby. By contrast, about one-fourth of the students in Grades 8 and 11 engaged in a science hobby.

13. Recreational activities: This questionnaire item asked students how much they enjoyed visiting a science museum or watching a television show about science. Achievement markedly increased at each successive grade level with respect to enjoyment of these activities. Students who enjoyed watching a television show about science or visiting a science museum outperformed the statewide average by 2 percentage points (Grade 4), 5 percentage points (Grade 8), or 8 percentage points (Grade 11). By comparison, the performance of students who replied that they did not enjoy these activities was below the statewide average by from 4 to 9 percentage points.

Consistent with student interest for other science activities, student interest in this activity was lower in Grades 8 and 11. While 44% of the students in Grade 4 indicated that they enjoyed watching a television show or visiting a museum, approximately half as many students in Grades 8 and 11 indicated a similar interest.

Summary Profiles

In order to further summarize the information presented in this chapter, profiles of those student questionnaire characteristics found to be related to achievement are presented below for each grade level.

Students in Grade 4 who tended to outperform the statewide average were those who:

- -- were male
- -- said science was one of their favorite subjects
- -- said they studied science two or three times a week

Students in Grade 4 who tended not to perform as well as the statewide sample were those who:

- -- were female
- -- said science was their least favorite or most favorite subject
- -- did not believe science can make life better
- -- did not like class discussions about science topics
- -- felt that doing laboratory experiments is "okay"
- -- said that they studied science only once a week or less often
- -- did not like visiting a museum or watching a television show about science

Students in Grade 8 who tended to outperform the statewide sample were those who:

- -- were male
- -- said science was one of their favorite subjects
- -- considered the study of science very valuable to society
- -- enjoyed class discussions about science topics
- -- enjoyed visiting a museum or watching a television show about science

Students in Grade 8 who tended not to perform as well as the statewide sample were those who:

- -- were female
- -- said science was their least favorite subject
- -- did not enjoy class discussions about science topics
- -- felt that doing laboratory experiments is "okay" or did not enjoy doing laboratory experiments
- -- said they hardly ever spent time on science activities
- -- did not enjoy visiting a museum or watching a television show about science

Students in Grade 11 who tended to outperform the statewide sample were those who:

- were male
- said science was either one of their favorites or their favorite subject
- felt that the study of science is very valuable to society
- felt that science courses will be valuable or very valuable after they leave school
- were presently taking a science course
- enjoyed class discussions about science topics
- enjoyed doing laboratory experiments
- spent time on science activities once or twice a week
- said they have a science hobby
- enjoyed visiting a museum or watching a television show about science

Students in Grade 11 who tended not to perform as well as the statewide sample were those who:

- were female
- said science was one of their least favorite subjects
- felt that the study of science was either not valuable or useless to society
- felt that science courses will not be valuable or will be useless
- last took a science course last year, or two years ago or more
- did not enjoy classroom discussions about science topics
- felt that doing laboratory experiments is "okay" or do not like doing them
- hardly ever spent time on science activities
- did not enjoy visiting a museum or watching a television show about science

Additional Highlights of the Student Questionnaire

The first parts of this chapter contained a discussion of those questionnaire variables which were shown to bear a relationship to achievement. In addition, an examination of the responses to other questionnaire responses may provide a policy-relevant characterization of students and student attitudes regarding science throughout Connecticut. Highlights of these questionnaire responses are presented in the rest of this chapter.

A total of 18 questions were included on the questionnaire administered to fourth-graders, 16 items on the questionnaire for eighth-graders, and 29 items on the eleventh-graders' questionnaire. Copies of these questionnaires can be found in Appendix B. Table 8.2 presents the percentage of students at each grade level selecting each alternative to each question. That table is organized so that common items administered at all three grade levels appear first, followed by items administered to two grade levels or only one grade level. Also included in that table are the corresponding data for items that had been administered in the 1974-75 assessment.

CLASSROOM ACTIVITIES. Student enjoyment of a number of science classroom activities was questioned. These activities included lectures, class discussions, reading books, doing laboratory experiments, and watching the teacher do experiments. Consistently for each activity, a greater percentage of students in Grade 4 than in either Grade 8 or 11 reported enjoying science activities.

- Actually doing laboratory experiments: Student response to this activity was more positive than for any other activity listed. The percentage of students responding that they liked to do experiments "very much" was 85%, 77%, and 57% for Grades 4, 8, and 11, respectively.

- Lectures about science: This activity appeared to be least popular with students in Grades 4 and 8, and second least popular with eleventh-graders. Although one-quarter of the students in Grade 4 said that they liked this activity, only 6% of the eighth-graders and 5% of the eleventh-graders reported liking this activity.

- Reading school books about science: While almost half (49%) of the fourth-graders liked this activity, this was true for only 11% of the students in Grade 8. This activity was least popular with the students in Grade 11; only 4% of these students indicated that they liked this activity.

USE OF THE METRIC SYSTEM. In Grade 8, most students (83%) reported that they use either the metric system alone or both the metric and customary systems of measuring in their study of science. (This question appeared on the Grade 8 questionnaire only.)

TABLE 8.2

Frequency Distribution of Student Questionnaire Responses for All Three Grade Levels

Item	Item #	Percentages of Students					
		Grade 4 CAEP		Grade 8 CAEP		Grade 11 CAEP	
		1980	1975	1980	1975	1980	1975
Are you a	1						
boy?		45.9	51.4	46.0	51.1	47.5	48.7
girl?		54.0	48.5	53.3	48.7	52.3	50.7
How do you feel about science compared to the other things you study in school?	4						
Science is my least favorite.		9.5	10.6	10.3	12.9	13.5	13.8
Science is not one of my favorites.		20.6	18.8	29.3	31.9	41.5	44.4
Science is one of my favorites.		53.5	48.2	51.5	44.2	39.3	36.1
Science is my favorite.		16.2	22.2	8.1	10.8	5.5	5.2
Do you have a hobby at home connected with any of the things you study in science?	7						
Yes		48.8	49.2	24.8	31.6	23.5	19.8
No		51.0	50.8	74.4	68.2	75.1	80.0
How much do you enjoy watching a show about science on television or visiting a science museum?	8						
I like these very much.		43.9	59.6	25.5	28.0	22.0	22.9
I think these are okay.		52.2	32.2	62.3	60.5	60.3	62.0
I don't like these.		3.7	8.1	11.4	11.3	17.5	14.9

NOTE: Because of rounding error and/or non-responses by students to questionnaire items, percentages do not always total to 100%.

TABLE 8.2 (continued)

Frequency Distribution of Student Questionnaire Responses for All Three Grade Levels

Item	Item #	Percentages of Students					
		Grade 4 CAEP		Grade 8 CAEP		Grade 11 CAEP	
		1980	1975	1980	1975	1980	1975
Here is a list of activities which might take place in your science class. For each activity, please fill in one circle which best shows how much you enjoy that activity.							
Lectures	9						
I like lectures about science very much.		24.7	39.7	5.8	9.3	5.4	5.4
Lectures about science are okay.		63.3	49.5	45.8	44.4	44.5	46.8
I do not like lectures about science.		11.9	10.8	47.8	46.0	49.7	47.3
Class discussions of science topics	10						
I like class discussions of science topics very much.		42.0	42.0	29.4	34.4	26.0	22.5
Class discussions of science topics are okay.		50.3	48.2	61.7	55.7	60.2	63.2
I do not like class discussions of science topics.		7.6	9.7	8.1	9.5	13.3	13.8
Reading school books about science	11						
I like to read science books very much.		48.7	47.2	10.8	10.6	4.2	4.8
Reading science books is okay.		40.6	39.9	48.2	46.8	34.5	38.5
I do not like to read science books.		10.6	12.8	40.3	42.1	60.8	55.9
Actually doing laboratory experiments	12						
I like to do experiments very much.		85.2	83.5	76.9	73.2	56.8	56.6
Doing experiments is okay.		13.1	13.8	20.8	22.4	36.3	35.2
I do not like to do experiments.		1.6	2.6	1.6	4.1	6.4	7.7

TABLE 8.2 (continued)

Frequency Distribution of Student Questionnaire Responses for All Three Grade Levels

Item	Item #	Percentages of Students					
		Grade 4 CAEP		Grade 8 CAEP		Grade 11 CAEP	
		1980	1975	1980	1975	1980	1975
Watching the teacher do experiments	13						
I like to watch the teacher do experiments very much.		52.1	59.9	30.4	36.2	35.1	37.1
Watching the teacher do experiments is okay.		38.6	33.5	53.3	48.3	53.8	52.5
I do not like to watch the teacher do experiments.		8.6	6.6	15.6	15.2	10.5	9.9
Region	*						
RESCUE		10.6		10.3		9.8	
CES		20.7		22.0		22.6	
CREC		30.4		29.4		30.0	
ACES		22.4		22.6		22.4	
LEARN		11.6		11.6		11.1	
NARES		4.3		4.1		4.1	
Size of Community	*						
Big Cities		14.2		15.6		13.6	
Fringe Cities		26.2		25.9		26.2	
Medium Cities		24.1		25.0		28.5	
Smaller Places		35.5		33.6		31.7	
How hard is science compared to the other things you study in school?	14						
Science is easier than most of the other things.		23.8	33.6	19.7	21.0		
Science is about the same as the other things.		61.2	51.6	59.2	58.9		
Science is harder than most of the other things.		14.8	14.8	20.3	20.0		

* Region and size of community frequencies are included here for information purposes even though these were not student questionnaire items.

TABLE 8.2 (continued)

Frequency Distribution of Student Questionnaire Responses for All Three Grade Levels

Item	Item #	Percentages of Students					
		Grade 4 CAEP		Grade 8 CAEP		Grade 11 CAEP	
		1980	1975	1980	1975	1980	1975
Do you like to learn about scientists of the past?	15						
Yes		79.3		44.2			
No		20.5		54.9			
How valuable do you feel the study of science and technology is to society?	6						
Useless				.9	2.0	1.5	1.2
Not very valuable				8.8	9.6	5.4	6.6
Valuable				48.1	41.0	39.5	38.6
Very valuable				41.4	47.0	53.4	53.1
Which of the following things do you do most often when you are doing science in school?	5						
Work with plants, animals, rocks, and other things related to science.		23.5	37.8				
Write about science.		5.8	5.3				
Listen to the teacher talk about science.		25.6	25.0				
Talk to other children about science.		1.4	6.2				
Read about science.		43.5	25.6				
Do you think science will make life better for you and your family?	6						
Yes		87.9					
No		11.9					

TABLE 8.2 (continued)

Frequency Distribution of Student Questionnaire Responses for All Three Grade Levels

Item	Item #	Percentages of Students					
		Grade 4 CAEP		Grade 8 CAEP		Grade 11 CAEP	
		1980	1975	1980	1975	1980	1975
How many time EACH WEEK do you study science?	16						
Never		8.5					
Once a week		26.4					
Twice a week		23.3					
Three times a week		18.0					
Four times a week		23.6					
Do you have a special book that you often use during your science lessons?	17						
Yes		66.0					
No		33.8					
Does your teacher set aside a special place in your classroom for science projects?	18						
Yes		44.9					
No		55.0					
In your science classes, how much of the time do you actually spend on activities such as working with plants and animals, using chemicals, or performing experiments?	5						
Never or hardly ever				17.1	26.5		
Once or twice a month				16.8	17.2		
Once or twice a week				41.5	30.3		
Just about every day				23.9	25.7		

TABLE 8.2 (continued)

Frequency Distribution of Student Questionnaire Responses for All Three Grade Levels

Item	Item #	Percentages of Students					
		Grade 4 CAEP		Grade 8 CAEP		Grade 11 CAEP	
		1980	1975	1980	1975	1980	1975
In your study of science in school, do you use the metric system (kilograms, liters, etc.) or our customary system?	16						
Metric system				35.5			
Customary system				11.3			
Both systems				47.4			
Neither system				5.0			
In your science classes, how much of the time do you actually spend on activities such as gathering data, conducting experiments, or using science equipment?	5						
Never or hardly ever						17.5	17.3
Once or twice a month						16.9	14.3
Once or twice a week						52.1	52.6
Just about every day						12.5	15.5
How valuable do you feel your science courses will be to you after you have finished high school?	14						
Useless						7.2	6.6
Not very valuable						36.2	39.0
Valuable						38.5	38.0
Very valuable						17.8	16.0
When was the last time you had a science course?	15						
Two years ago or longer						6.7	9.2
Last year						34.6	30.6
I am taking one or more this year.						58.6	60.0

TABLE 8.2 (continued)

Frequency Distribution of Student Questionnaire
Responses for All Three Grade Levels

Item	Item #	Percentages of Students					
		Grade 4 CAEP		Grade 8 CAEP		Grade 11 CAEP	
		1980	1975	1980	1975	1980	1975
In Grades 9-12, have you had or are you taking any of the following science courses?							
General Science	16						
Yes						47.7	50.8
No						44.5	46.1
Don't know						4.3	2.7
Earth Science	17						
Yes						50.2	45.7
No						42.9	51.1
Don't know						3.3	2.5
Biology	18						
Yes						87.9	88.4
No						10.6	10.2
Don't know						.7	.8
Chemistry	19						
Yes						49.4	48.5
No						45.8	49.8
Don't know						.9	1.2
Physics	20						
Yes						16.6	15.1
No						74.7	81.8
Don't know						1.4	2.1
Second-year Biology	21						
Yes						8.6	9.5
No						82.3	87.4
Don't know						1.7	2.7
Second-year Chemistry	22						
Yes						2.0	2.1
No						89.0	95.4
Don't know						1.4	2.1

TABLE 8.2 (continued)

Frequency Distribution of Student Questionnaire Responses for All Three Grade Levels

Item	Item #	Percentages of Students					
		Grade 4 CAEP		Grade 8 CAEP		Grade 11 CAEP	
		1980	1975	1980	1975	1980	1975
Second-year Physics	23						
Yes						1.3	1.8
No						89.3	95.5
Don't know						1.5	2.4
Do you think your school offers a sufficient number or variety of science courses for students of your interest and ability level?	24						
Yes						79.9	
No						19.6	
Indicate whether you agree, disagree, or are undecided about each of the following statements.							
The scientist is willing to let people test or question what he or she believes is true.	25						
Agree						76.3	80.9
Disagree						7.8	6.2
Undecided						15.7	12.5
Science helps us to control the forces of nature.	26						
Agree						51.4	63.3
Disagree						31.8	22.0
Undecided						16.6	14.4

TABLE 8.2 (continued)

Frequency Distribution of Student Questionnaire Responses for All Three Grade Levels

Item	Item #	Percentages of Students					
		Grade 4 CAEP		Grade 8 CAEP		Grade 11 CAEP	
		1980	1975	1980	1975	1980	1975
Science does NOT tell us right from wrong in our relations with people.	27						
Agree						62.2	64.7
Disagree						17.2	17.2
Undecided						20.5	17.8
Science has the answers to most of the unsolved problems in our society.	28						
Agree						23.3	61.8
Disagree						55.1	17.3
Undecided						21.4	20.5
The scientific way of solving problems can be used to solve the problems of human beings.	29						
Agree						32.9	33.6
Disagree						36.7	38.7
Undecided						30.2	27.4

SCIENCE COURSE OFFERINGS. Most students in Grade 11 (80%) said that their school offered a sufficient number or variety of science courses. (This question appeared on the Grade 11 questionnaire only.)

ATTITUDE TOWARD SCIENCE, GRADE 11.

-- Right of the public to question scientific findings: Three-fourths of the students in Grade 11 agreed that the scientist is willing to let people test or question what he or she believes is true.

-- Ability of science to control nature: About half of the students agreed that science helps us to control the forces of nature. One-third of the students disagreed with this statement, while the remainder (17%) were undecided.

-- Ability of science to tell us right from wrong: Most students (62%) agreed that science does NOT tell us right from wrong in our relations with people. Of the remaining students, about as many students were undecided concerning this statement (21%) as disagreed with this statement (17%).

-- Ability of science to solve societal problems: More than half of the students (55%) disagreed with the statement that science has the answers to most of the unsolved problems in our society. About 23% of the students agreed with this statement while 21% were undecided about this issue.

-- Appropriateness of scientific methods in solving human problems: There was no prevailing student response to this question. Student responses were about equally distributed across response categories to the statement "The scientific way of solving problems can be used to solve the problems of human beings."

Comparisons of Student Attitudes from CAEP 1974-75 to CAEP 1979-80

Student responses to questionnaire items that were repeated from the previous assessment were very similar. However, response differences found in two items are worthy of mention here.

CLASSROOM ACTIVITIES, GRADE 4. When asked to select the classroom science activity in which they most often engaged, significantly more students in the present assessment (44%) selected reading than in the previous assessment (26%). By comparison, 14% fewer students reported actually working with science materials in 1979-80 than in 1974-75.

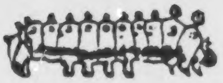
ABILITY OF SCIENCE TO SOLVE SOCIETAL PROBLEMS. The item which revealed the largest change in student attitude from CAEP 1974-75 to the present assessment involved student agreement with the statement that science has the answers to most of the unsolved problems in our society. In the 1974-75 assessment, approximately two-thirds of the students in Grade 11 agreed with this statement. By comparison, less than one-quarter of the eleventh-grade students in the present assessment agreed with this statement.

APPENDIX A

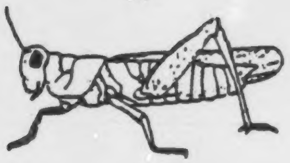
Copies of Test Items for Fourth-, Eighth-, and Eleventh-graders, with Corresponding Percentages of All Students Selecting Each Response

GRADE 4

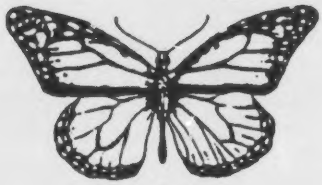
TEST INSTRUMENT

1. This caterpillar  will grow up to look like which of the following?

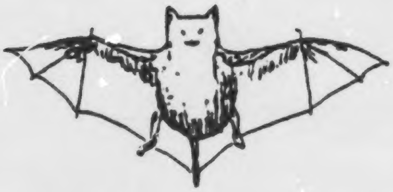
A



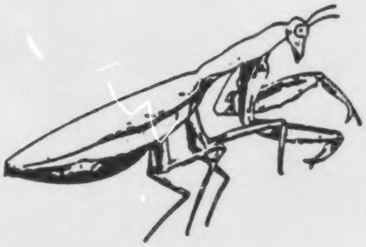
B



C



D



3% 1 ○ A
*95% 2 ○ B
0% 3 ○ C
1% 4 ○ D

1% 5 ○ I don't know.

2. Which of these trees stays green in the United States during the winter?

2% 1 ○ apple
4% 2 ○ elm
4% 3 ○ maple
*82% 4 ○ pine

8% 5 ○ I don't know.

3. Which of the following statements is true about seeds?

23% 1 ○ All plants produce seeds.
9% 2 ○ All fruits contain a large number of seeds.
1% 3 ○ All seeds are good to eat.
*45% 4 ○ Every seed contains a young plant, stored food and a seed coat.
4% 5 ○ The food stored in seeds is always in the cotyledon.

16% 6 ○ I don't know.

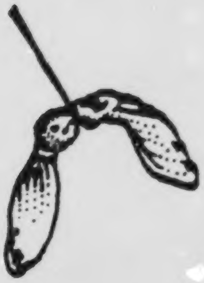
4. Which of these plants does NOT have green leaves?

13% 1 ○ a dandelion
2% 2 ○ grass
*74% 3 ○ a mushroom
4% 4 ○ a willow tree

3% 5 ○ I don't know.

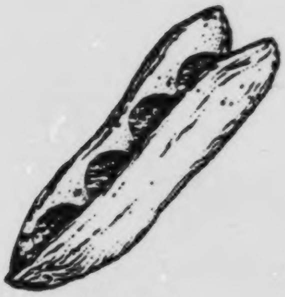
5. Sometimes seeds stick to animals and are carried to new places where they will later grow. Which of these seeds would most likely be spread this way?

A



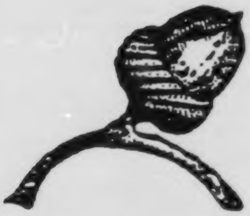
maple seed

B



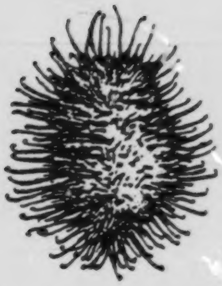
bean pod

C



acorn

D



cocklebur

14% 1 ○ A
9% 2 ○ B
9% 3 ○ C
*62% 4 ○ D

6% 5 ○ I don't know.

6. Our Sun is a

9% 1 ○ planet.
5% 2 ○ satellite.
16% 3 ○ solar system.
*67% 4 ○ star.

3% 5 ○ I don't know.

7. One reason that there is day and night on Earth is that the

9% 1 ○ Sun turns.
2% 2 ○ Moon turns.
*84% 3 ○ Earth turns.
4% 4 ○ Sun gets dark at night.

1% 5 ○ I don't know.

8. Which of the following is the largest body?

13% 1 ○ Earth
3% 2 ○ Mars
4% 3 ○ the Moon
*60% 4 ○ the Sun
9% 5 ○ Venus

9% 6 ○ I don't know.

NOTE: Item 8 was also administered in Grade 8.

9. Each year the Earth moves once around

1% 1 ○ Mars.
2% 2 ○ Venus.
*71% 3 ○ the Sun.
8% 4 ○ the Moon.
8% 5 ○ all of the other planets.

9% 6 ○ I don't know.

NOTE: Item 9 was also administered in Grade 8.

10. Clouds may be high, middle, or low.
High clouds are above 20,000 feet.
Middle clouds are between 6,000 and 20,000 feet.
Low clouds are between the ground and 6,000 feet.

A cloud at 10,000 feet is a

10% 1 ○ low cloud.
*72% 2 ○ middle cloud.
12% 3 ○ high cloud.

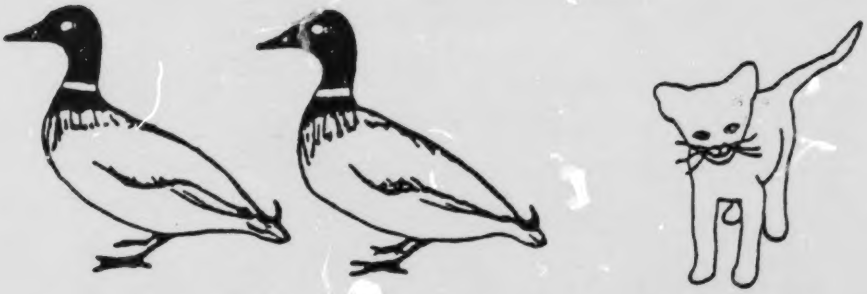
5% 4 ○ I don't know.

11. On a summer day, which of the following clouds is most likely to bring rain?

4% 1 ○ thin fluffy clouds
1% 2 ○ red clouds at sunset
*85% 3 ○ thick dark-gray clouds
5% 4 ○ clouds that look like white sheep

4% 5 ○ I don't know.

NOTE: Item 11 was also administered in Grade 8.



12. If D stands for duck and C stands for cat, which of the following best represents the picture?

2% 1 ○ D, C, C
1% 2 ○ D, C, D
*93% 3 ○ D, D, C
2% 4 ○ D, D, D

2% 5 ○ I don't know.

13. What is the main way that sweating helps your body?

*18% 1 ○ It helps cool your body.
23% 2 ○ It keeps your skin moist.
6% 3 ○ It keeps you from catching cold.
32% 4 ○ It gets rid of the salt in your body.

21% 5 ○ I don't know.

14. Why is it cooler to wear light-colored clothes in the summer?

33% 1 ○ Light-colored clothes let more air in.
10% 2 ○ Light-colored clothes prevent sweating.
15% 3 ○ Light-colored clothes are not as heavy as dark-colored clothes.
*32% 4 ○ Light-colored clothes reflect more sunlight than dark-colored clothes.

9% 5 ○ I don't know.

NOTE: Item 14 was also administered in Grade 8.

15. Evaporation takes place in all of the following cases EXCEPT

13% 1 ○ a wet chalkboard dries.
7% 2 ○ dewdrops disappear from a leaf.
18% 3 ○ water disappears from a birdbath.
*22% 4 ○ the outside of a cold glass gets wet.
16% 5 ○ a swimmer sits in the sun after he leaves the water.

23% 6 ○ I don't know.

16. When an animal breathes faster and its heart beats faster, the animal is most likely

5% 1 ○ cold.
*78% 2 ○ frightened.
10% 3 ○ resting.
4% 4 ○ sleeping.

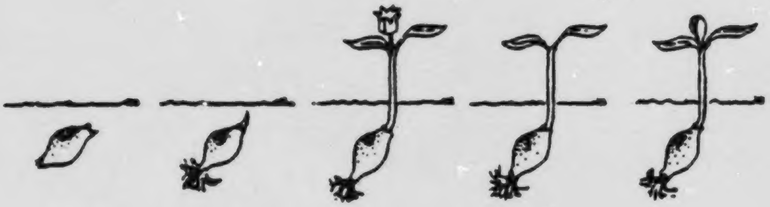
2% 5 ○ I don't know.

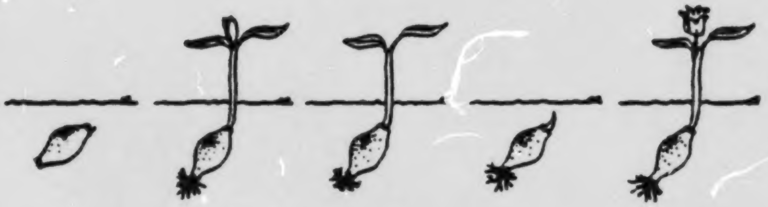
17. If you want to find out how much a boy grew in 1 year, which of the following MUST you know about the boy?

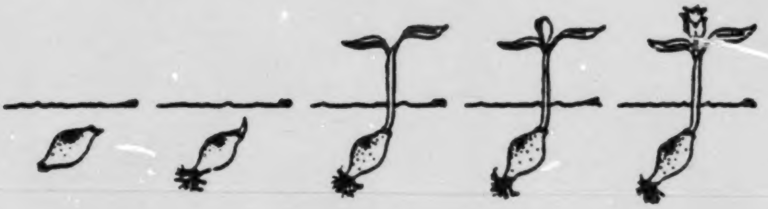
16% 1 ○ his age
10% 2 ○ the type of food he eats
*67% 3 ○ his height at the start of the year
3% 4 ○ the height of his mother and father

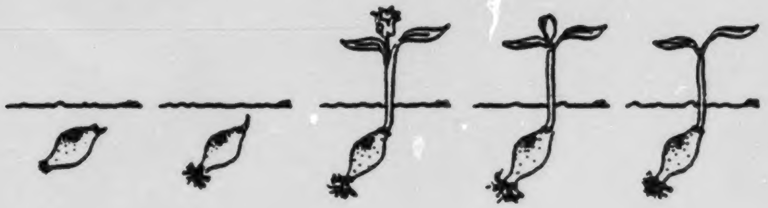
3% 5 ○ I don't know.

18. Which row of pictures shows BEST the way a plant grows?

4% 1 ○ 

2% 2 ○ 

*85% 3 ○ 

6% 4 ○ 

2% 5 ○ I don't know.

19. A baby chick grows inside an egg for 21 days before it hatches. Where does the baby chick get its food before it hatches?

15% 1 ○ It is fed by the mother hen.
21% 2 ○ It doesn't need any food.
12% 3 ○ It makes its own food.
*38% 4 ○ The food is stored in the egg.

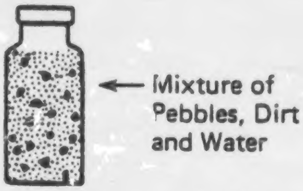
13% 5 ○ I don't know.

20. Someone said that if you mix salt and sugar with water and let the mixture stand you get salt-water taffy--a kind of candy. Which of the following would be the best way for you to test this idea?

5% 1 ○ Take a vote among your friends.
10% 2 ○ Buy some salt-water taffy and see if it has salt in it.
10% 3 ○ Find out if salt and sugar have the same chemicals in them.
4% 4 ○ Grind up some salt-water taffy to see if you get salt, sugar, and water.
*61% 5 ○ Try to mix salt, sugar, and water, let them stand, and see what happens.

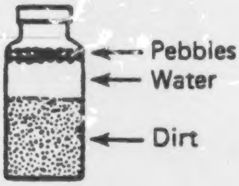
10% 6 ○ I don't know.

21. Arthur put water in a jar. Then he added spoonfuls of pebbles and dirt until the jar was nearly full. He covered the jar and shook it. It then looked like this:

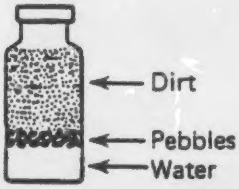

Mixture of
Pebbles, Dirt
and Water

If he let the jar stand covered without shaking it for a week, the jar would look most like which of these pictures?

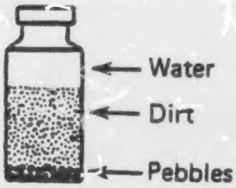
A


Pebbles
Water
Dirt

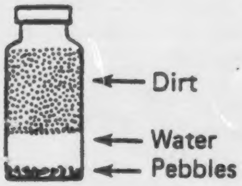
B


Dirt
Pebbles
Water

C

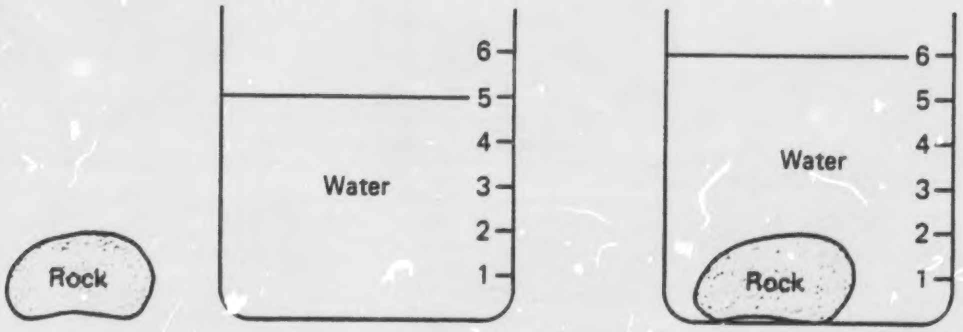

Water
Dirt
Pebbles

D


Dirt
Water
Pebbles

8% 1 ○ A
6% 2 ○ B
*73% 3 ○ C
9% 4 ○ D

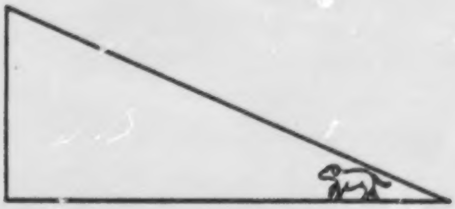
3% 5 ○ I don't know.


Rock
Water
6
5
4
3
2
1
Water
Rock
6
5
4
3
2
1

22. A rock is put into a pail that has some water in it. Before the rock is put into the pail, the water is at the 5-liter line. After the rock is added, the water rises to the 6-liter line. The space taken up by the rock is

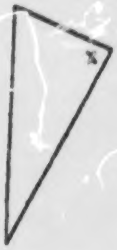
*71% 1 ○ 1 liter.
5% 2 ○ 5 liters.
15% 3 ○ 6 liters.
3% 4 ○ 11 liters.

6% 5 ○ I don't know.

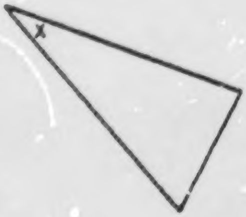


23. Above is a picture John drew of a dog in a yard. Which of the following pictures shows an X in the same place in the yard as the dog in John's picture?

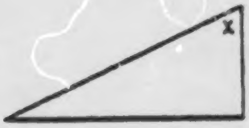
A



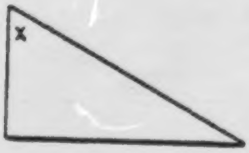
B



C



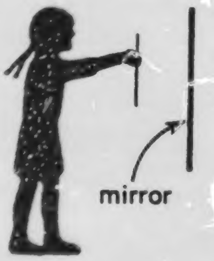
D



4% 1 ○ A
*78% 2 ○ B
2% 3 ○ C
12% 4 ○ D

3% 5 ○ I don't know.

24. You hold a paper with the word **POPSICLE** in front of you while you look into a mirror as shown in this diagram.



What does the word look like when you see it in the mirror?

9% 1 ○ **POPSICLE**

20% 2 ○ **ꟼOꟼƧIƆ⅃Ǝ**

*48% 3 ○ **Ǝ⅃ƆIƧꟼOꟼ**

20% 4 ○ **ELCISPOP**

2% 5 ○ I don't know.

NOTE: Item 24 was also administered in Grade 8.

25. All of the following can be called matter EXCEPT

9% 1 ○ ice.
*36% 2 ○ ideas.
22% 3 ○ shoes.
6% 4 ○ water.

25% 5 ○ I don't know.

26. Iron is most likely to rust when it is

*77% 1 ○ damp.
7% 2 ○ dry.
2% 3 ○ painted.
4% 4 ○ covered with soap.
6% 5 ○ covered with grease.

4% 6 ○ I don't know.

27. A different substance is formed when

10% 1 ○ cloth is cut.
7% 2 ○ a cup breaks.
*46% 3 ○ a candle burns.
12% 4 ○ a piece of chalk falls apart.

24% 5 ○ I don't know.

28. What can scientists learn by studying some fossils?

5% 1 ○ why earthquakes took place
*70% 2 ○ what animals lived long ago
8% 3 ○ how far the Moon is from Earth
6% 4 ○ what the weather will be tomorrow

9% 5 ○ I don't know.

29. Scientists would have most trouble testing which of these?

13% 1 ○ I have a fever.
8% 2 ○ I weigh 101 pounds.
10% 3 ○ I am 62 inches tall.
10% 4 ○ I can lift a 20-pound box.
*44% 5 ○ My dog is better than your dog.

15% 6 ○ I don't know.

NOTE: Item 29 was also administered in Grade 8.

30. Which of the following would be easiest to measure with a ruler that is 12 inches long?

*76% 1 ○ the length of a pencil
13% 2 ○ the thickness of a sheet of paper
4% 3 ○ the distance from your home to the school
2% 4 ○ the distance from your home to the nearest grocery store

4% 5 ○ I don't know.

31. A liter of water at a temperature of 50° Celsius is mixed with a liter of water at 70° Celsius. The temperature of the water just after mixing will be ABOUT

5% 1 ○ 20° C.
4% 2 ○ 50° C.
*10% 3 ○ 60° C.
5% 4 ○ 70° C.
64% 5 ○ 120° C.

11% 6 ○ I don't know.

NOTE: Item 31 was also administered in Grade 8.

32. A doctor kept records of breathing rates of people when they were resting. He made the chart below.

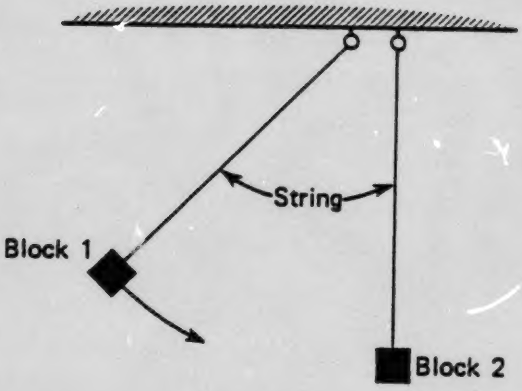
BREATHING RATES

Person	Breaths in a Minute
Baby boys	38
7-year-old girls	25
7-year-old boys	25
10-year-old boys	20
Mothers	16

The chart suggests that

10% 1 ○ boys breathe faster than girls.
2% 2 ○ girls breathe faster than boys.
8% 3 ○ older people breathe faster than younger people.
*74% 4 ○ younger people breathe faster than older people.

6% 5 ○ I don't know.



33. When Block 1 swings down and hits Block 2, which of the following will most likely happen?

5% 1 ○ Block 2 will not move at all.
13% 2 ○ Block 2 will swing off to the left.
*73% 3 ○ Block 2 will swing off to the right.
4% 4 ○ The string holding Block 2 will break.

4% 5 ○ I don't know.

34. Bill took a glass of water and weighed it. He put the glass of water in a freezer until the water froze.

Which one of these sentences tells what he would find if he weighed it again after it froze?

72% 1 ○ The glass of ice would weigh more than the glass of water.
10% 2 ○ The glass of ice would weigh less than the glass of water.
*12% 3 ○ The glass of ice would weigh the same as the glass of water.

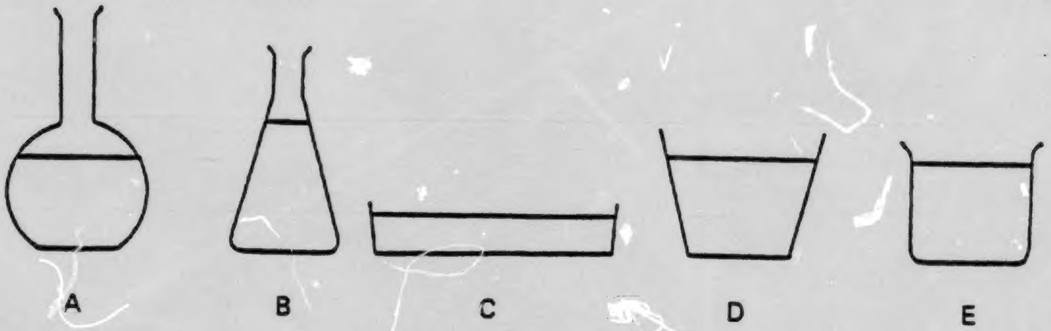
5% 4 ○ I don't know.

35. Why are the rocks and pebbles found in river beds usually smooth?

14% 1 ○ The rocks are very old.
*42% 2 ○ The rocks rubbed against other rocks.
15% 3 ○ Rivers only flow where rocks are smooth.
14% 4 ○ Animals in the river keep rubbing against the rocks.

14% 5 ○ I don't know.

36. A liter of water is poured into each of the containers shown below and they are left uncovered in a warm room.



After a day, which container will have the LEAST amount of water left in it?

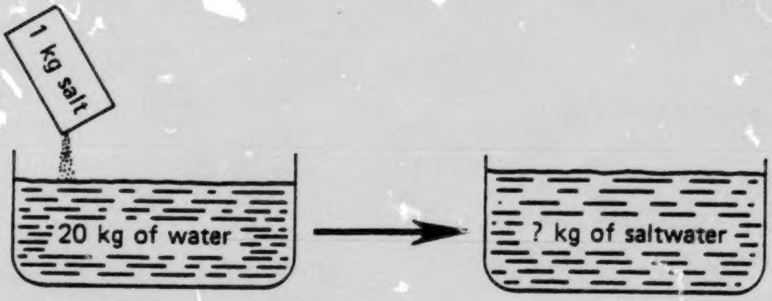
10% 1 ○ A
9% 2 ○ B
*65% 3 ○ C
4% 4 ○ D
3% 5 ○ E

8% 6 ○ I don't know.

37. Which one of the following is MOST likely to make a rock break open?

11% 1 ○ dew evaporating on the rock
6% 2 ○ tree leaves decaying on the rock
9% 3 ○ snow melting in a crack in the rock
*59% 4 ○ water freezing in a crack in the rock

14% 5 ○ I don't know.



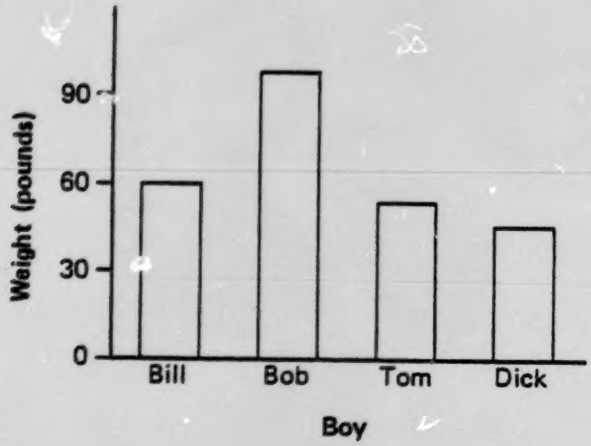
38. One kilogram of salt is completely dissolved in twenty kilograms of water. The resulting saltwater will weigh

7% 1 ○ nineteen kilograms.
13% 2 ○ twenty kilograms.
*51% 3 ○ twenty-one kilograms.
11% 4 ○ The weight is unpredictable.

17% 5 ○ I don't know.

NOTE: Item 38 was also administered in Grades 8 and 11.

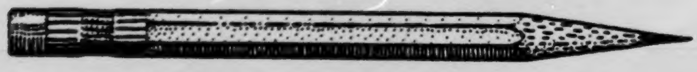
39. This graph shows the weights of four boys.



How much does Bill weigh?

1% 1 ○ 30 pounds
1% 2 ○ 40 pounds
*91% 3 ○ 60 pounds
5% 4 ○ 90 pounds

1% 5 ○ I don't know.



40. About how long is the pencil shown above?

5% 1 ○ 1 centimeter
9% 2 ○ 2.5 centimeters
17% 3 ○ 4 centimeters
*50% 4 ○ 10 centimeters
7% 5 ○ 100 centimeters

11% 6 ○ I don't know.

41. No human being has ever seen a dinosaur. What is the best evidence that dinosaurs once lived?

16% 1 ○ pictures in museums
*64% 2 ○ fossils
9% 3 ○ pictures on the walls of caves
4% 4 ○ present animals that have evolved from them

6% 5 ○ I don't know.

NOTE: Item 41 was also administered in Grade 8.

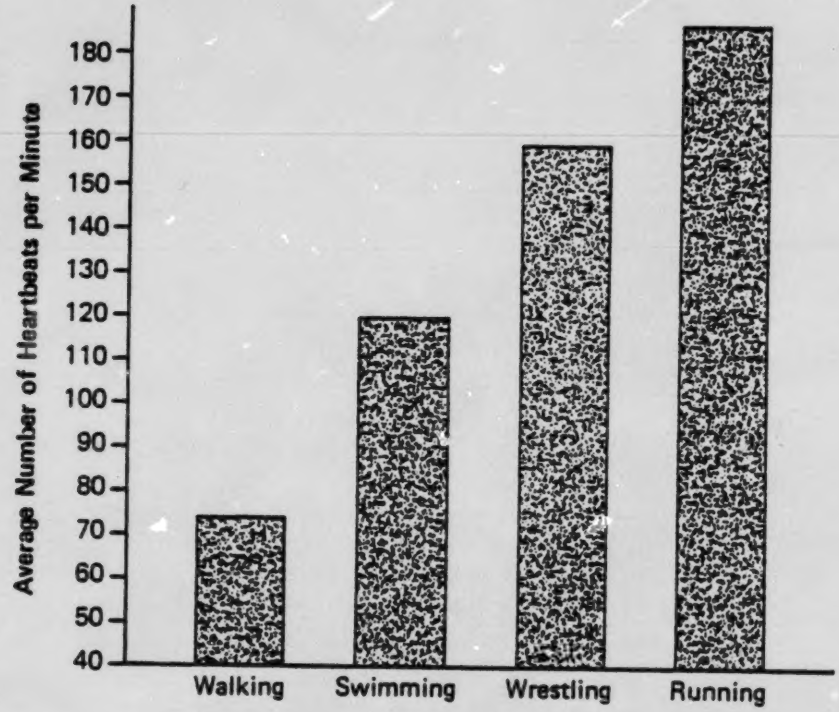
Weights of Some Chemical Elements Found in a 100-Pound Human

Calcium	2 pounds
Carbon	18 pounds
Hydrogen	10 pounds
Oxygen	64 pounds
Phosphorus	14 ounces
Sodium	2 ounces
Sulfur	4 ounces

42. From the chart above, which of the following chemical elements is found in the SMALLEST amount in the body?

15% 1 ○ calcium
5% 2 ○ carbon
4% 3 ○ hydrogen
*56% 4 ○ sodium
5% 5 ○ sulfur

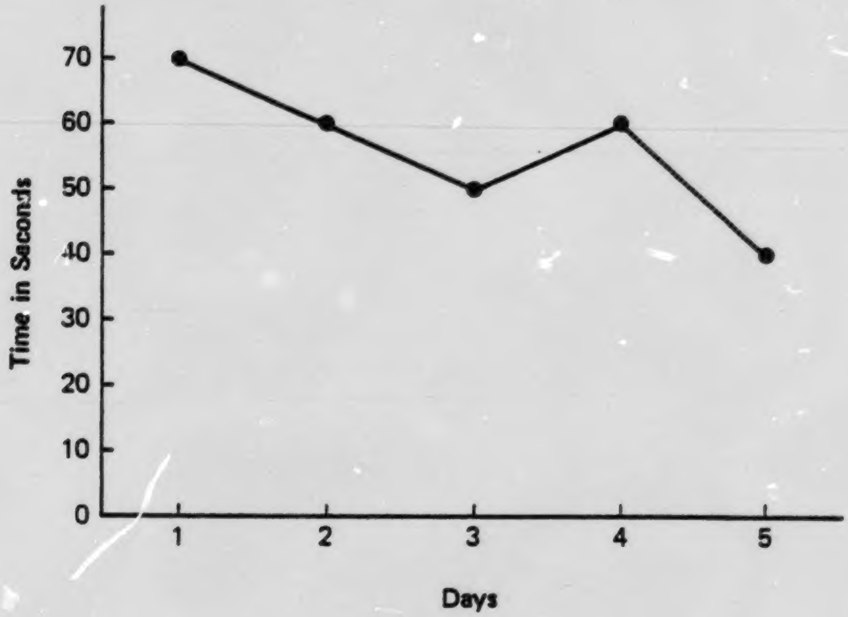
14% 6 ○ I don't know.



43. According to the graph above, your heart probably beats fastest when you are

2%	1	○ walking.
2%	2	○ swimming.
2%	3	○ wrestling.
*92%	4	○ running.
2%	5	○ I don't know.

Blast O'Wind is a race horse that runs around a track each day. The graph below shows the time it took Blast O'Wind to run around the track each day.



44. Look at the graph. On which day did Blast O'Wind run the fastest?

52% 1 ○ Day 1
4% 2 ○ Day 2
*36% 3 ○ Day 5

7% 4 ○ I don't know.

45. Look at the graph again. Then FILL IN the number of seconds that are missing in the table below.

Day	Seconds
1	70
2	60
3	47-53
4	60
5	40

Correct: 76%

Incorrect: 14%

No Response: 10%

GRADE 8

TEST INSTRUMENT

The blood carries on many functions in the human body. Indicate whether each of the next four questions describes a function of the blood.

1. Is it a function of the blood to protect against disease?

*69% 1 ○ yes
26% 2 ○ no

5% 3 ○ I don't know.

NOTE: Item 1 was also administered in Grade 11.

2. Is it a function of the blood to carry waste materials away from the cells?

*70% 1 ○ yes
23% 2 ○ no

7% 3 ○ I don't know.

NOTE: Item 2 was also administered in Grade 11.

3. Is it a function of the blood to digest food?

15% 1 ○ yes
*80% 2 ○ no

5% 3 ○ I don't know.

NOTE: Item 3 was also administered in Grade 11.

4. Is it a function of the blood to carry oxygen to different parts of the body?

*90% 1 ○ yes
8% 2 ○ no

2% 3 ○ I don't know.

NOTE: Item 4 was also administered in Grade 11.

5. When a person sees something, what carries the message from the eyes to the brain?

5% 1 ○ arteries
3% 2 ○ glands
2% 3 ○ muscles
*82% 4 ○ nerves
3% 5 ○ veins

5% 6 ○ I don't know.

6. What is the most important thing that the lungs do?

0% 1 ○ hold the chest out
1% 2 ○ protect against germs
0% 3 ○ move different parts of the body
12% 4 ○ pump the blood through the body
*84% 5 ○ provide a place for oxygen to enter the blood

1% 6 ○ I don't know.

7. About how long would it take a rocket ship to reach the Moon?

1% 1 ○ two hours
11% 2 ○ several hours
*55% 3 ○ a few days
11% 4 ○ a light-year
9% 5 ○ several years

12% 6 ○ I don't know.

8. Which of the following is the largest body?

9% 1 ○ Earth
2% 2 ○ Mars
3% 3 ○ the Moon
*77% 4 ○ the Sun
5% 5 ○ Venus

4% 6 ○ I don't know.

NOTE: Item 8 was also administered in Grade 4.

9. Each year the Earth moves once around

0% 1 ○ Mars.
1% 2 ○ Venus.
*85% 3 ○ the Sun.
8% 4 ○ the Moon.
4% 5 ○ all of the other planets.

3% 6 ○ I don't know.

NOTE: Item 9 was also administered in Grade 4.

10. The time it takes the Moon to go from new moon to full moon and back to new moon is about

2% 1 ○ ½ day.
9% 2 ○ 1 day.
16% 3 ○ 14 days.
*45% 4 ○ 28 days.
13% 5 ○ 365 days.

14% 6 ○ I don't know.

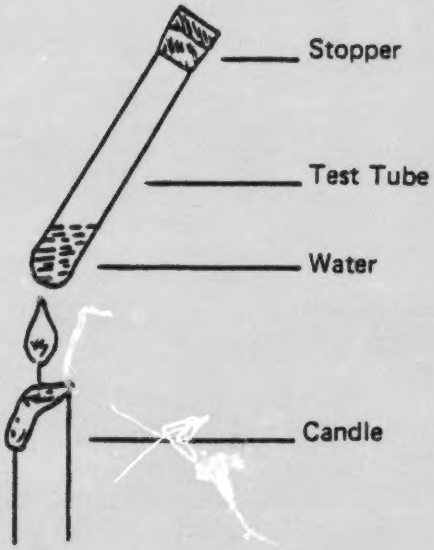
11. On a summer day, which of the following clouds is most likely to bring rain?

2%	1 ○ thin fluffy clouds
1%	2 ○ red clouds at sunset
*91%	3 ○ thick dark-gray clouds
3%	4 ○ clouds that look like white sheep
2%	5 ○ a few lines of clouds high in the sky
2%	6 ○ I don't know.

NOTE: Item 11 was also administered in Grade 4.

12. A spoon in a glass of water appears to bend sharply at the water surface. This apparent bending is due to

5%	1 ○ absorption.
5%	2 ○ color bands.
9%	3 ○ interference.
*44%	4 ○ refraction.
12%	5 ○ shadows.
24%	6 ○ I don't know.



13. Water is heated as shown in the diagram above. If the stopper pops out, which of the following is most important in accounting for this?

19% 1 ○ The stopper gets hot and expands.
*53% 2 ○ Some of the water is changed to steam.
11% 3 ○ The air in the test tube absorbs heat.
1% 4 ○ The glass test tube gets very hot and starts to melt.
10% 5 ○ The glass test tube expands more than the stopper.

6% 6 ○ I don't know.

14. Why is it cooler to wear light-colored clothes in the summer?

12% 1 ○ Light-colored clothes let more air in.
5% 2 ○ Light-colored clothes prevent sweating.
6% 3 ○ Light-colored clothes are not as heavy as dark-colored clothes.
*74% 4 ○ Light-colored clothes reflect more sunlight than dark-colored clothes.

3% 5 ○ I don't know.

NOTE: Item 14 was also administered in Grade 4.

15. Which of the following most clearly forms molecules different from those present at the start?

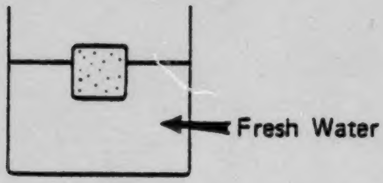
46% 1 ○ ice melting
3% 2 ○ a cup breaking
2% 3 ○ cloth being torn
*20% 4 ○ a candle burning
8% 5 ○ a piece of chalk falling apart

21% 6 ○ I don't know.

16. The density of the human body is most nearly equal to the density of

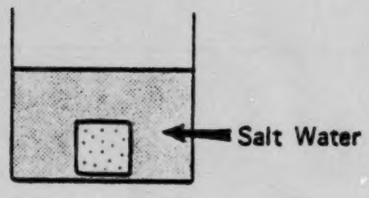
13% 1 ○ air.
8% 2 ○ cork.
9% 3 ○ hydrogen.
7% 4 ○ iron.
*32% 5 ○ water.

31% 6 ○ I don't know.

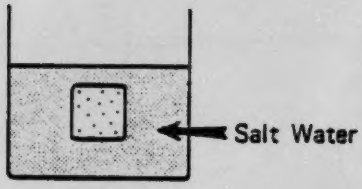

Fresh Water

17. A block of wood floats in fresh water as shown above. If this block were placed in saltwater from the ocean, which of the following diagrams shows what would happen?

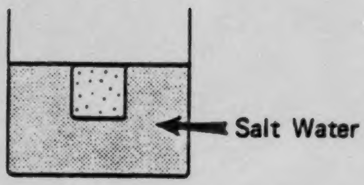
A



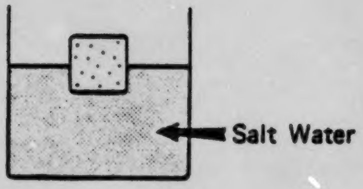
B



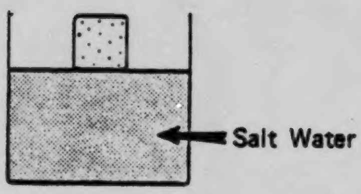
C



D



E



15% 1 ○ A
4% 2 ○ B
10% 3 ○ C
*40% 4 ○ D
26% 5 ○ E

5% 6 ○ I don't know.

18. Some air is pumped out of a can and the can collapses. Which of the following best explains why this happened?

3% 1 ○ Air molecules inside the can collapsed.

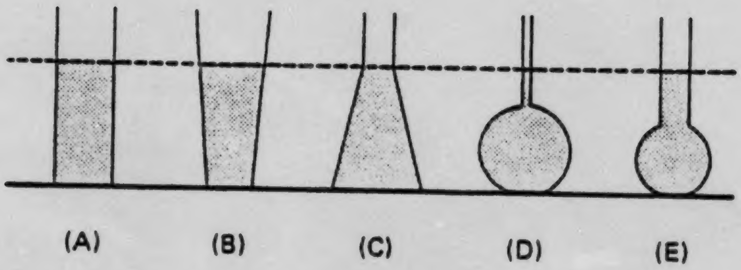
13% 2 ○ Pumping out the air molecules weakened the can.

2% 3 ○ The air molecules inside the can condensed to form water.

*63% 4 ○ The air pressure inside the can became less than the pressure outside the can.

8% 5 ○ Pumping the air out of the can increased the number of air molecules around the can.

10% 6 ○ I don't know.



19. A quart of water at room temperature (70° Fahrenheit) is poured into each of the five containers as shown above. When the water in all five is heated to 150° Fahrenheit, the water level will be highest in container

11% 1 ○ A.

6% 2 ○ B.

9% 3 ○ C.

*55% 4 ○ D.

5% 5 ○ E.

13% 6 ○ I don't know.

20. What is the major cause of air pollution in MOST large American cities?

64%	1	○ factories
3%	2	○ open trash burners
1%	3	○ fog
*30%	4	○ cars
1%	5	○ I don't know.

NOTE: Item 20 was also administered in Grade 4.

21. A man notices that the paint on one side of his house is not lasting as well as the paint on the other sides. Which of the following is the most likely cause?

2%	1	○ termites
8%	2	○ cosmic rays
*85%	3	○ wind or sun
8%	4	○ fallout from atom bombs
0%	5	○ sonic booms from low-flying jets
3%	6	○ I don't know.

22. Which of the following would LEAST upset the balance of animal and plant life in a small area?

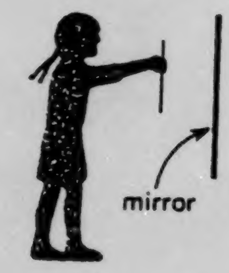
11%	1	○ burning a forest
4%	2	○ draining a swamp
10%	3	○ constructing a dam
*64%	4	○ broadcasting radio waves
6%	5	○ killing all hawks, owls, and vultures in the area
4%	6	○ I don't know.

23. Which of the following best describes the results of pasteurization of milk?

33% 1 ○ All bacteria are killed.
23% 2 ○ The milk is homogenized.
9% 3 ○ The taste of milk is improved.
*27% 4 ○ Bacteria harmful to humans are killed.
4% 5 ○ The milk is permanently kept from spoiling.

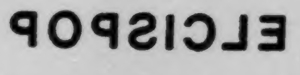
8% 6 ○ I don't know.

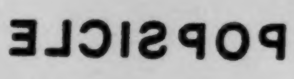
24. You hold a paper with the word **POPSICLE** in front of you while you look into a mirror as shown in this diagram.



What does the word look like when you see it in the mirror?

2% 1 ○ **POPSICLE**

15% 2 ○ 

*71% 3 ○ 

11% 4 ○ **ELCISPOP**

0% 5 ○ I don't know.

NOTE: Item 24 was also administered in Grade 4.

25. To get the salt out of saltwater, one could

2% 1 ○ cool the water.
5% 2 ○ add more water.
*61% 3 ○ boil away the water.
5% 4 ○ dissolve air in the water.
4% 5 ○ remove all of the air from the water.

16% 6 ○ I don't know.

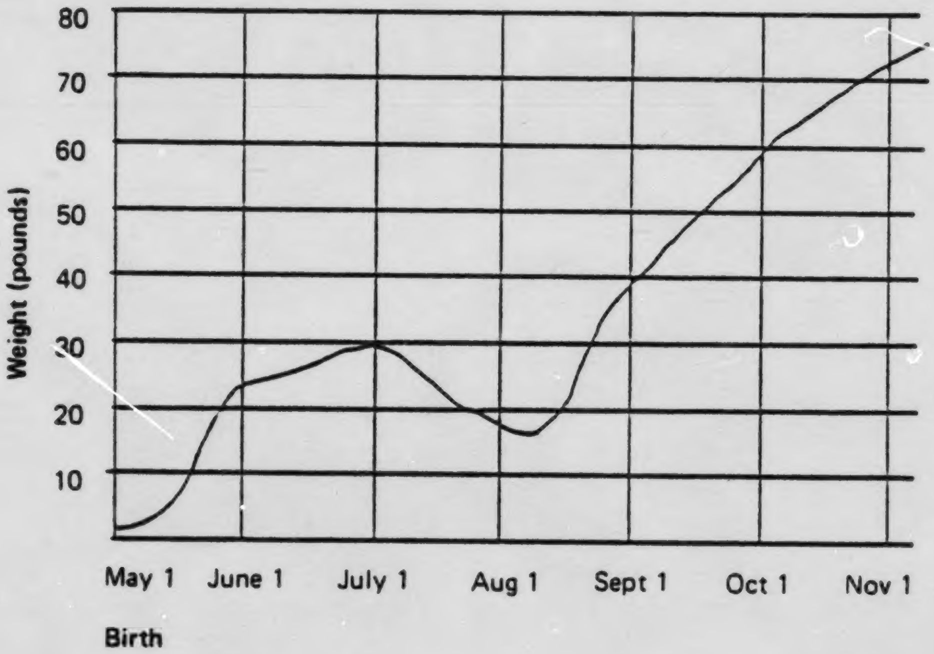
26. If all green plants died, what would be the most important effect on man?

13% 1 ○ He would have to eat meat only.
*44% 2 ○ Sooner or later man would die of starvation.
32% 3 ○ Man would get a little sick because he couldn't get vitamins.
3% 4 ○ Man couldn't build houses because there would be no lumber.
3% 5 ○ The land would be bare and not very pretty for man to look at.

4% 6 ○ I don't know.

27. Michael kept a record of his dog's weight from birth on May 1 in order to find out how much dog food to give his dog. The directions on the bag of dog food for feeding a dog are as follows:

Weight of Dog	Number of Cups of Food Daily
Under 20 pounds	1
20 to 40 pounds	2
41 to 60 pounds	3
Over 60 pounds	4



In what month should the dog's daily allowance have been increased to 4 cups?

2% 1 ○ July

10% 2 ○ August

5% 3 ○ September

*63% 4 ○ October

17% 5 ○ November

3% 6 ○ I don't know.

28. Each of 30 students measures the length of a playground. Which one of the following probably will be closest to the actual length?

12% 1 ○ any one of the 30 results
9% 2 ○ the average of the 10 largest results
*54% 3 ○ the average of all 30 results
3% 4 ○ the average of the 10 smallest results
7% 5 ○ the largest result

15% 6 ○ I don't know.

NOTE: Item 28 was also administered in Grade 11.

29. Scientists would have the most trouble testing which of the following?

7% 1 ○ I have a fever.
4% 2 ○ I am 62 inches tall.
1% 3 ○ I weigh 101 pounds.
5% 4 ○ I can lift a 20-pound box.
*78% 5 ○ My dog is better than your dog.

5% 6 ○ I don't know.

NOTE: Item 29 was also administered in Grade 4.

30. Which of the following is true of hot water as compared with cold water?

9% 1 ○ It is denser.
3% 2 ○ It is easier to see through.
*56% 3 ○ Its molecules are moving faster.
9% 4 ○ It has more free oxygen dissolved in it.
4% 5 ○ It has more free hydrogen dissolved in it.

18% 6 ○ I don't know.

31. A liter of water at a temperature of 50° Celsius is mixed with a liter of water at 70° Celsius. The temperature of the water just after mixing will be ABOUT

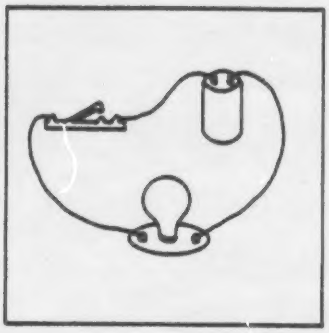
7% 1 ○ 20° C.
2% 2 ○ 50° C.
*50% 3 ○ 60° C.
4% 4 ○ 70° C.
31% 5 ○ 120° C.

6% 6 ○ I don't know.

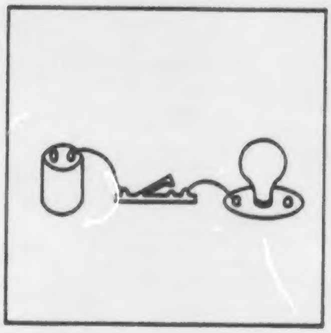
NOTE: Item 31 was also administered in Grade 4.

32. Look at the four pictures below. Each shows a battery, a bulb and a switch. Which bulb will light when the switch is closed? Fill in the circle beside the picture you choose.

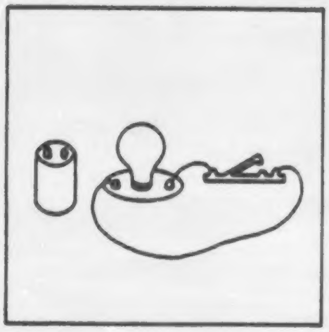
*75% 1 ○



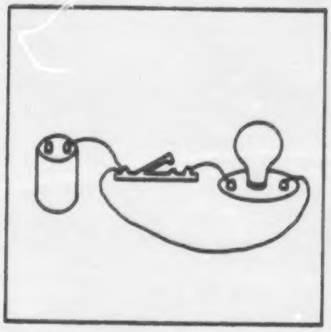
9% 2 ○



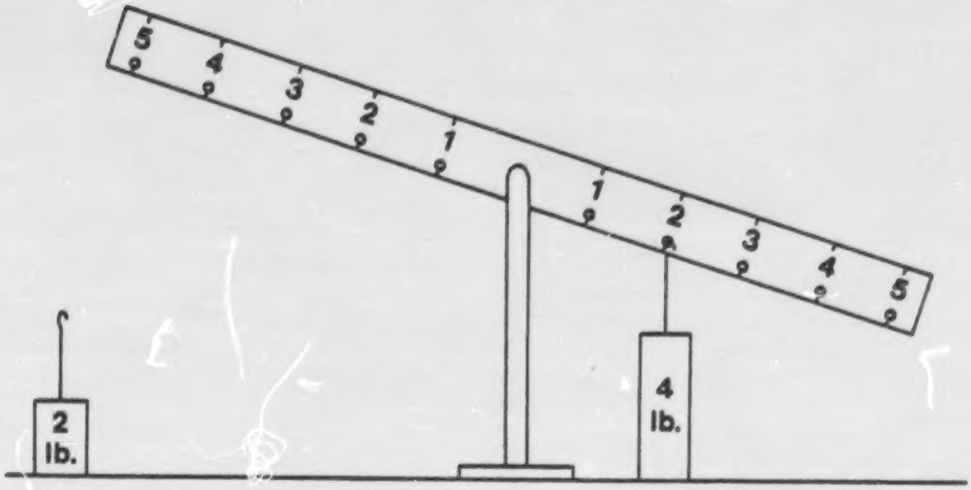
1% 3 ○



10% 4 ○



3% 5 ○ I don't know.



33. In order to make the beam balance, you should hang a 2-pound weight on the LEFT-HAND SIDE at position

5% 1 ○ 1.
11% 2 ○ 2.
4% 3 ○ 3.
*63% 4 ○ 4.
14% 5 ○ 5.

3% 6 ○ I don't know.

34. Bill took a glass of water and weighed it. He put the glass of water in a freezer until the water froze.

Which one of these sentences tells what he would find if he weighed it again after it froze?

56% 1 ○ The glass of ice would weigh more than the glass of water.
11% 2 ○ The glass of ice would weigh less than the glass of water.
*30% 3 ○ The glass of ice would weigh the same as the glass of water.

3% 4 ○ I don't know.

35. A meadow has about 100 weeds growing in it. It has had about the same number of weeds in it for the last 10 years. This year these weeds produced about 1,000,000 seeds. How many weeds will the meadow probably have next year?

3% 1 ○ none
*25% 2 ○ about 100
20% 3 ○ about 1,000
42% 4 ○ about 1,000,000

10% 5 ○ I don't know.

NOTE: Item 35 was also administered in Grade 11.

36. Fish and other animals in the ocean take oxygen out of the ocean water. Much of the oxygen dissolved in the ocean water comes from

3% 1 ○ lowtide beach sand.
*70% 2 ○ plants living in the water.
10% 3 ○ chemical breakdown of salt.
8% 4 ○ decaying plants and animals.

9% 5 ○ I don't know.

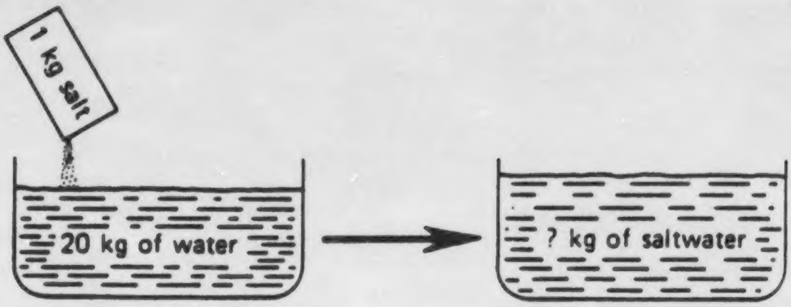
NOTE: Item 36 was also administered in Grade 11.

37. Which one of the following is MOST likely to make a rock break open?

7% 1 ○ dew evaporating on the rock
4% 2 ○ tree leaves decaying on the rock
7% 3 ○ snow melting in a crack in the rock
*75% 4 ○ water freezing in a crack in the rock

7% 5 ○ I don't know.

NOTE: Item 37 was also administered in Grade 4.



38. One kilogram of salt is completely dissolved in twenty kilograms of water. The resulting saltwater will weigh

3% 1 ○ nineteen kilograms.
12% 2 ○ twenty kilograms.
*56% 3 ○ twenty-one kilograms.
17% 4 ○ The weight is unpredictable.

11% 5 ○ I don't know.

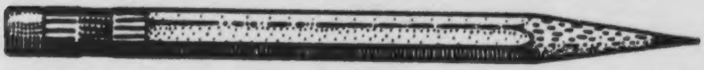
NOTE: Item 38 was also administered in Grades 4 and 11.

39. The statement that the relative humidity is 50 percent means that

28% 1 ○ the chance of rain is 50 percent.
7% 2 ○ the atmosphere contains 50 pounds of water per cubic mile.
8% 3 ○ the atmosphere contains 50 grams of water per cubic meter.
6% 4 ○ the atmosphere would be saturated with water if the air temperature were 50° F.
*26% 5 ○ the atmosphere contains half as much water as it could contain at its present temperature.

23% 6 ○ I don't know.

NOTE: Item 39 was also administered in Grade 11.



40. About how long is the pencil shown above?

3% 1 ○ 10 kilograms
1% 2 ○ 10 liters
8% 3 ○ 10 millimeters
6% 4 ○ 10 meters
*73% 5 ○ 10 centimeters

8% 6 ○ I don't know.

41. No human being has ever seen a dinosaur. What is the best evidence that dinosaurs once lived?

3% 1 ○ pictures in museums
*88% 2 ○ fossils
4% 3 ○ pictures on the walls of caves
4% 4 ○ present animals that have evolved from them

1% 5 ○ I don't know.

NOTE: Item 41 was also administered in Grade 4.

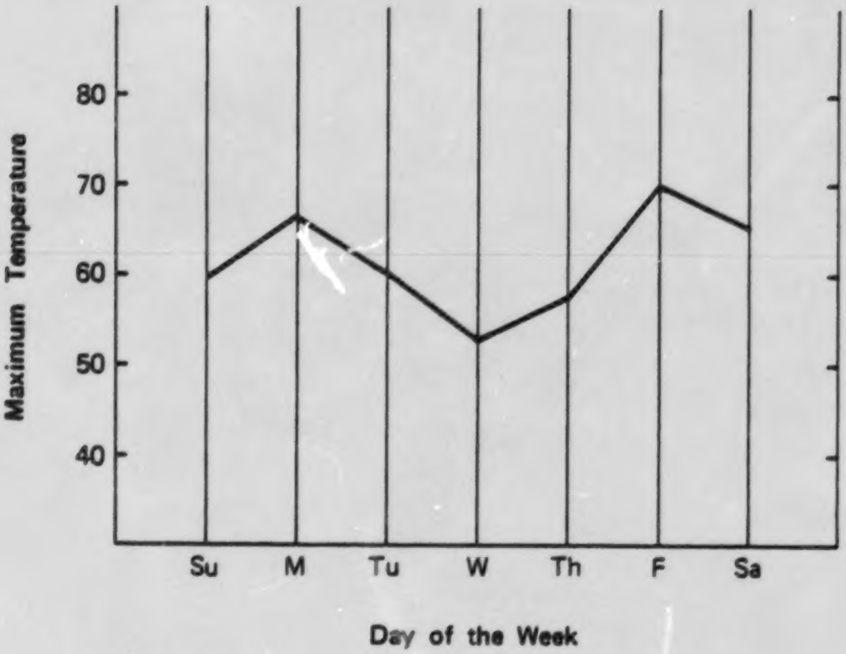
42. Fertilization takes place when a sperm

*77% 1 ○ enters an egg.
4% 2 ○ becomes an egg.
7% 3 ○ becomes an embryo.
5% 4 ○ enters another sperm.
3% 5 ○ reaches a certain age.

4% 6 ○ I don't know.

43. What is needed to move cars, heat hamburgers, and light rooms?

1%	1 ○ conservation
1%	2 ○ efficiency
*88%	3 ○ energy
6%	4 ○ friction
1%	5 ○ magnetism
4%	6 ○ I don't know.



44. According to the graph above, the highest temperature was recorded on

0%	1 ○ Sunday.
0%	2 ○ Monday.
1%	3 ○ Wednesday.
*96%	4 ○ Friday.
2%	5 ○ Saturday.
0%	6 ○ I don't know.

45. When one sees a powder made up of both white specks and black specks, one is able to conclude that it is

0% 1 ○ sugar.
14% 2 ○ pepper.
*70% 3 ○ a mixture.
4% 4 ○ an element.
6% 5 ○ a pure compound.

5% 6 ○ I don't know.

46. From which of these can all kinds of matter be formed?

*60% 1 ○ atoms
13% 2 ○ compounds
11% 3 ○ mixtures
5% 4 ○ protons

10% 5 ○ I don't know.

47. Atoms of all the elements have

12% 1 ○ the same mass.
*36% 2 ○ nuclei in them.
5% 3 ○ the same weights.
14% 4 ○ an attraction for electrons.
9% 5 ○ the same number of charged particles.

23% 6 ○ I don't know.

48. What is a scientific theory?

2% 1 ○ It uses arithmetic.
3% 2 ○ It describes a scientist.
17% 3 ○ It describes an experiment.
13% 4 ○ It tells all there is to know about something.
*61% 5 ○ It explains why some things act the way they do.

5% 6 ○ I don't know.

49. Whenever scientists carefully measure any quantity many times, they expect that

23% 1 ○ all of the measurements will be exactly the same.
4% 2 ○ only two of the measurements will be exactly the same.
5% 3 ○ all but one of the measurements will be exactly the same.
*58% 4 ○ most of the measurements will be close but not exactly the same.

9% 5 ○ I don't know.

NOTE: Item 49 was also administered in Grade 11.

50. To determine the average height of 13-year-olds, it would be MOST important to have a large number of

4% 1 ○ scales.
7% 2 ○ yardsticks.
*74% 3 ○ 13-year-olds.
4% 4 ○ people doing the measuring.
6% 5 ○ observers of each measurement.

3% 6 ○ I don't know.

51. Which one of the following is essential in an experiment?

5% 1 ○ making sure measurements can be made quickly
*52% 2 ○ controlling all important variables
6% 3 ○ using new equipment
26% 4 ○ having at least two persons doing the experiment

9% 5 ○ I don't know.

NOTE: Item 51 was also administered in Grade 11.

52. Which of the following statements is an opinion rather than a fact about cats?

5% 1 ○ Cats eat mice.
2% 2 ○ Cats have fur.
2% 3 ○ Cats have tails.
9% 4 ○ Cats are related to tigers.
*79% 5 ○ Siamese cats are prettier than other cats.

1% 6 ○ I don't know.

53. Which of the following helps to account for the fact that a compass can be used to find north on Earth?

7% 1 ○ Earth has only one moon.
*58% 2 ○ Earth has a magnetic field.
9% 3 ○ Earth reflects the Sun's light.
4% 4 ○ Most of Earth is covered by water.
4% 5 ○ Earth's temperature is not constant.

17% 6 ○ I don't know.

54. Some people think that the solution to coal, gas and oil shortages is to switch over to electricity. In other words, if we run out of gas and oil we can just switch over to electric cars. What is wrong with this idea?

*49% 1 ○ Most electricity is produced from coal, gas and oil.
8% 2 ○ If we switch over to electricity many people will lose their jobs.
7% 3 ○ It has been proven that it is impossible to build electric cars in great quantities.
15% 4 ○ Electricity is far too expensive.
12% 5 ○ There is nothing wrong with this idea.

8% 6 ○ I don't know.

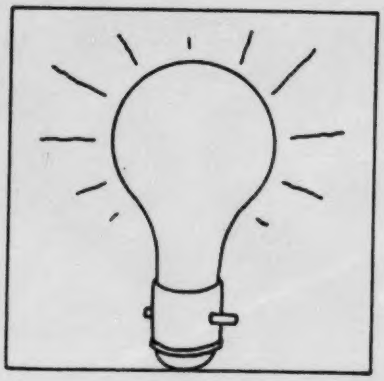
55. Most of the chemical energy of the gasoline burned in a car is not used to move the car but is changed into

36% 1 ○ electricity.
*35% 2 ○ heat.
1% 3 ○ light.
1% 4 ○ magnetism.
4% 5 ○ sound.

16% 6 ○ I don't know.

Do the following three illustrations show energy being changed (transformed) from one form to another?

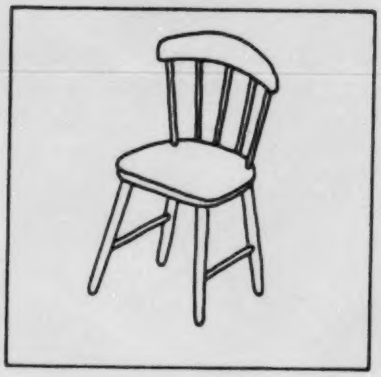
56.



*72% 1 ○ Yes, shows energy change.
24% 2 ○ No, doesn't show energy change.

3% 3 ○ I don't know.

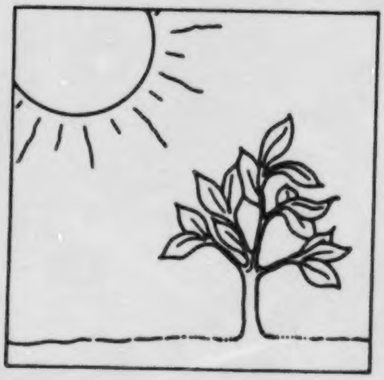
57.



4% 1 ○ Yes, shows energy change.
*94% 2 ○ No, doesn't show energy change.

2% 3 ○ I don't know.

58.



*90% 1 ○ Yes, shows energy change.
7% 2 ○ No, doesn't show energy change.

2% 3 ○ I don't know.

NOTE: Items 56-58 were also administered in Grade 11.

59. An average serving of which of the following foods would provide the most protein for building and repairing body tissues?

5%	1 ○	boiled potatoes
30%	2 ○	green beans
*38%	3 ○	lean meat
6%	4 ○	oatmeal
8%	5 ○	white bread
13%	6 ○	I don't know.

60. Seeds come from which of the following parts of a plant?

1%	1 ○	bark
*67%	2 ○	flower
8%	3 ○	leaf
12%	4 ○	root
10%	5 ○	stem
2%	6 ○	I don't know.

61. Green plants make sugar by the process called

4%	1 ○	digestion.
4%	2 ○	evaporation.
12%	3 ○	osmosis.
*57%	4 ○	photosynthesis.
4%	5 ○	respiration.
18%	6 ○	I don't know.

62. Green plants are important to animals because the plants

17% 1 ○ consume both food and oxygen.
15% 2 ○ consume food and give off oxygen.
6% 3 ○ consume food and give off carbon dioxide.
*46% 4 ○ produce food and give off oxygen.
9% 5 ○ produce food and give off carbon dioxide.

6% 6 ○ I don't know.

63. Joan planted beans in three flower pots. When all the plants were about an inch high she placed one pot in a dark closet, one in a window, and one under a light bulb which she kept on day and night. What was Joan probably trying to find out?

4% 1 ○ how high bean plants grow in the dark
2% 2 ○ if bean plants are as green as pea plants
4% 3 ○ how to get the most beans from bean plants
5% 4 ○ the effect of water and warmth on the growth of bean plants
*79% 5 ○ the effect of different amounts of light on the growth of bean plants

5% 6 ○ I don't know.

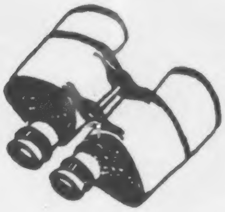
64. A parasite is an organism that

18% 1 ○ lives by getting food from dead organisms.
8% 2 ○ lives with another organism, and they help each other.
7% 3 ○ lives with another organism, but gets no food from the other organism.
*40% 4 ○ lives in or on another organism, from which it gets its food, without helping the other organism.

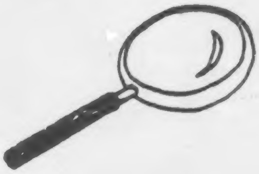
25% 5 ○ I don't know.

65. A girl wants to look at some very small living things in a drop of water. She knows that they are there but can't see them.

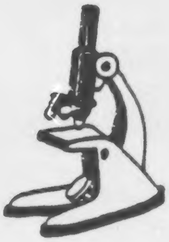
Which one of the pictures below shows the BEST object she can use to see these living things?



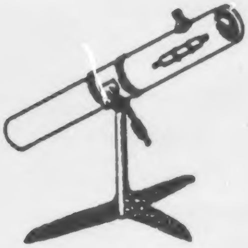
0% 1 ○ binoculars



3% 2 ○ magnifying glass



*95% 3 ○ microscope



1% 4 ○ telescope

0% 5 ○ I don't know.

GRADE 11

TEST INSTRUMENT

The blood carries on many functions in the human body. Indicate whether each of the next four questions describes a function of the blood.

1. Is it a function of the blood to protect against disease?

*80% 1 ○ yes
17% 2 ○ no

3% 3 ○ I don't know.

NOTE: Item 1 was also administered in Grade 8.

2. Is it a function of the blood to carry waste materials away from the cells?

*78% 1 ○ yes
16% 2 ○ no

5% 3 ○ I don't know.

NOTE: Item 2 was also administered in Grade 8.

3. Is it a function of the blood to digest food?

13% 1 ○ yes
*83% 2 ○ no

4% 3 ○ I don't know.

NOTE: Item 3 was also administered in Grade 8.

4. Is it a function of the blood to carry oxygen to different parts of the body?

*95% 1 ○ yes
3% 2 ○ no

1% 3 ○ I don't know.

NOTE: Item 4 was also administered in Grade 8.

5. Which of the following is often considered to be the simplest biological unit of structure?

*78% 1 ○ the cell
3% 2 ○ the organ
5% 3 ○ the tissue
5% 4 ○ the organism
2% 5 ○ the population

7% 6 ○ I don't know.

6. What is the function of the placenta in a pregnant human female?

3% 1 ○ to push the baby out at birth
11% 2 ○ to keep the baby warm and moist
*41% 3 ○ to carry nourishment to the baby
16% 4 ○ to cushion the baby against shocks
4% 5 ○ to keep the baby's body temperature constant

24% 6 ○ I don't know.

7. A meal consists of milk, bread and butter, meat, and cake. To satisfy the rules of good nutrition, what should be added to this meal?

*96% 1 ○ a green or yellow vegetable
1% 2 ○ baked beans
1% 3 ○ cheese
1% 4 ○ coffee or tea
0% 5 ○ pickles and olives

1% 6 ○ I don't know.

8. Which of the following animals is a vertebrate?

4% 1 ○ clam
*67% 2 ○ frog
5% 3 ○ octopus
5% 4 ○ spider
13% 5 ○ starfish

6% 6 ○ I don't know.

9. When a cell of a plant stem divides, each new cell has

23% 1 ○ half the number of chromosomes as the parent cell.
12% 2 ○ twice the number of chromosomes as the parent cell.
*56% 3 ○ the same number of chromosomes as the parent cell.

9% 4 ○ I don't know.

10. Which of the following is used in the treatment of diabetes?

1% 1 ○ estrogen
*83% 2 ○ insulin
1% 3 ○ iodine
6% 4 ○ penicillin
1% 5 ○ thyroxine

8% 6 ○ I don't know.

11. Of the following, cancer is best described as

1% 1 ○ a disease of the aged.
5% 2 ○ an inherited disease.
11% 3 ○ a consequence of infection.
*54% 4 ○ uncontrolled cell division.
24% 5 ○ a disease of the blood which then spreads to other parts of the body.

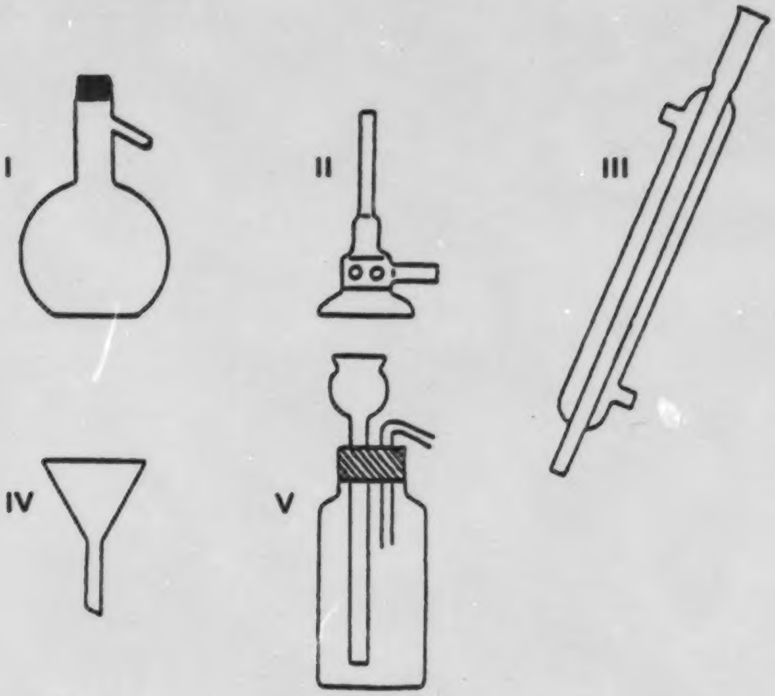
5% 6 ○ I don't know.

12. In hot climates, the advantage of buildings with white surfaces is that white surfaces effectively

6% 1 ○ absorb light.
18% 2 ○ diffract light.
*62% 3 ○ reflect light.
8% 4 ○ refract light.
2% 5 ○ transmit light.

4% 6 ○ I don't know.

13. Pictured below are pieces of laboratory equipment.



To obtain pure water from salt water, which of the pieces shown above would be most useful?

24% 1 ○ II and V
16% 2 ○ III and V
*20% 3 ○ I, II, and III
11% 4 ○ I, IV, and V
7% 5 ○ III, IV, and V

21% 6 ○ I don't know.

14. Two light waves are traveling in a vacuum. The wave with the higher frequency will have the

24% 1 ○ higher speed.
4% 2 ○ lower speed.
21% 3 ○ longer wavelength.
*28% 4 ○ shorter wavelength.
3% 5 ○ more nearly horizontal direction.

19% 6 ○ I don't know.

15. The particles that make up atoms are usually said to be

5% 1 ○ protons and electrons only.
7% 2 ○ protons and neutrons only.
*80% 3 ○ protons, neutrons, and electrons.
1% 4 ○ alpha, beta, and gamma rays.
1% 5 ○ alpha particles and beta particles only.

4% 6 ○ I don't know.

16. The solid, liquid, and gaseous states of water differ in which of the following ways?

3% 1 ○ the number of protons per molecule
6% 2 ○ the number of electrons per molecule
8% 3 ○ the net charge on the individual molecules
4% 4 ○ the number of neutrons per individual molecule
*57% 5 ○ the average speed with which the molecules are moving

21% 6 ○ I don't know.

17. The particles most directly involved in forming chemical bonds are

*54% 1 ○ electrons.
12% 2 ○ neutrons.
2% 3 ○ photons.
2% 4 ○ positrons.
15% 5 ○ protons.

14% 6 ○ I don't know.

18. If a sudden change took place on the surface of the Sun, the change could first be observed on Earth after about

12% 1 ○ 1 second.
11% 2 ○ 10 seconds.
9% 3 ○ 30 seconds.
*28% 4 ○ 8 minutes.
11% 5 ○ 1 hour.

27% 6 ○ I don't know.

19. You are looking to the west and observe a full moon near the horizon. What time is it?

*36% 1 ○ It is about sunrise.
3% 2 ○ It is about noon.
35% 3 ○ It is about sunset.
16% 4 ○ It is about midnight.

9% 5 ○ I don't know.

20. What is the major cause of air pollution in MOST large American cities?

52% 1 ○ factories
2% 2 ○ open trash burners
1% 3 ○ fog
*44% 4 ○ cars

1% 5 ○ I don't know.

NOTE: Item 20 was also administered in Grade 8.

21. Changes such as the conversion of limestone to marble or of soft coal to hard coal are explained as having been brought about

17% 1 ○ by sudden cooling of the material.
2% 2 ○ by exposure to gases from a volcano.
1% 3 ○ by exposure to an underground river.
10% 4 ○ by action of CO_2 from the atmosphere.
*50% 5 ○ by heat and pressure below the Earth's surface.

20% 6 ○ I don't know.

22. Suppose that a rubber balloon filled with air does not leak and that it is taken from Earth to the Moon. One can be sure that on the Moon, the balloon will have the same

34% 1 ○ size as on Earth.
*34% 2 ○ mass as on Earth.
4% 3 ○ weight as on Earth.
2% 4 ○ rate of fall as on Earth.
17% 5 ○ ability to float as on Earth.

8% 6 ○ I don't know.

23. Which statement best describes how the Earth's surface changes over billions of years?

6% 1 ○ A flat surface is gradually pushed up into steeper and steeper mountains until the world is covered with mountains.

16% 2 ○ Very steep mountains gradually wear down until most of the world is worn down to sea level.

*47% 3 ○ Very steep mountains gradually wear down into flat surfaces that may be again pushed up into mountains, and so on over and over again.

19% 4 ○ Very steep mountains and flat plains stay side by side for billions of years with little change.

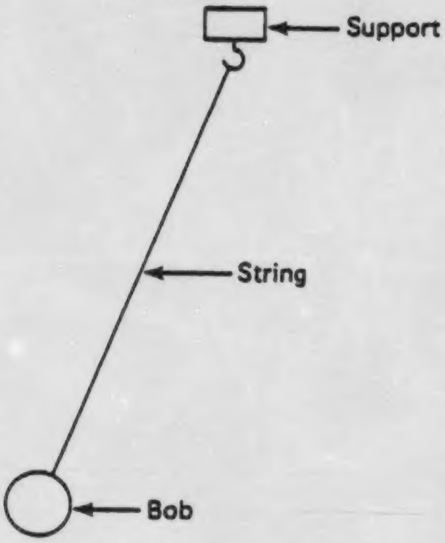
12% 5 ○ I don't know.

24. If a mineral sample contains large crystals, geologists believe that the mineral probably

9% 1 ○ was formed in a volcano.
8% 2 ○ contains a valuable metal.
23% 3 ○ cooled instantly under water.
6% 4 ○ has cleavage in three directions.
*30% 5 ○ solidified slowly from hot liquid.

24% 6 ○ I don't know.

25. The length of time required for a pendulum bob like that shown below to make one complete swing depends primarily upon the



22% 1 ○ mass of the bob.
1% 2 ○ temperature of the air.
*44% 3 ○ length of the pendulum string.
6% 4 ○ material of which the bob is made.
20% 5 ○ angle through which the bob swings.

7% 6 ○ I don't know.

26. Adding table salt to water results in the water's

*39% 1 ○ freezing at a lower temperature.
14% 2 ○ changing into its elements.
26% 3 ○ evaporating faster.
5% 4 ○ dissolving more air.
1% 5 ○ becoming radioactive.

13% 6 ○ I don't know.

27. In each of five experiments, two objects were weighed four times each. Which experiment gives the strongest evidence that object I weighs more than object II?

		Object I	Object II
*77%	1 ○ Experiment A	80 lb.	70 lb.
		81 lb.	69 lb.
		80 lb.	71 lb.
		82 lb.	70 lb.
5%	2 ○ Experiment B	69 lb.	81 lb.
		71 lb.	82 lb.
		70 lb.	80 lb.
		70 lb.	80 lb.
2%	3 ○ Experiment C	70 lb.	80 lb.
		75 lb.	75 lb.
		77 lb.	73 lb.
		80 lb.	70 lb.
1%	4 ○ Experiment D	80 lb.	70 lb.
		75 lb.	75 lb.
		73 lb.	77 lb.
		70 lb.	80 lb.
9%	5 ○ Experiment E	80 lb.	77 lb.
		79 lb.	76 lb.
		78 lb.	75 lb.
		77 lb.	74 lb.

5% 6 ○ I don't know.

28. Each of 30 students measures the length of a playground. Which one of the following probably will be closest to the actual length?

1% 1 ○ any one of the 30 results
7% 2 ○ the average of the 10 largest results
*71% 3 ○ the average of all 30 results
2% 4 ○ the average of the 10 smallest results
4% 5 ○ the largest result

8% 6 ○ I don't know.

NOTE: Item 28 was also administered in Grade 8.

29. If 2 liters of water at 40° C are mixed with 1 liter of water at 100° C, the temperature of the mixture immediately after mixing will be about

2% 1 ○ 40° C.
10% 2 ○ 50° C.
*58% 3 ○ 60° C.
15% 4 ○ 80° C.
2% 5 ○ 100° C.

12% 6 ○ I don't know.

Will each of the following help keep an iron nail from rusting?

		1 yes	2 no	3 I don't know.
30.	coating it with oil	*67% ○	21% ○	12% ○
31.	painting it	*57% ○	38% ○	4% ○
32.	wrapping it in a wet towel	1% ○	*95% ○	2% ○
33.	dipping it in vinegar	15% ○	*53% ○	31% ○
34.	putting it in a dry place	*69% ○	25% ○	5% ○

35. A meadow has about 100 weeds growing in it. It has had about the same number of weeds in it for the last 10 years. This year these weeds produced about 1,000,000 seeds. How many weeds will the meadow probably have next year?

2% 1 ○ none
*49% 2 ○ about 100
14% 3 ○ about 1,000
26% 4 ○ about 1,000,000

9% 5 ○ I don't know.

NOTE: Item 35 was also administered in Grade 8.

36. Fish and other animals in the ocean take oxygen out of the ocean water. Much of the oxygen dissolved in the ocean water comes from

1% 1 ○ lowtide beach sand.
*79% 2 ○ plants living in the water.
6% 3 ○ chemical breakdown of salt.
7% 4 ○ decaying plants and animals.

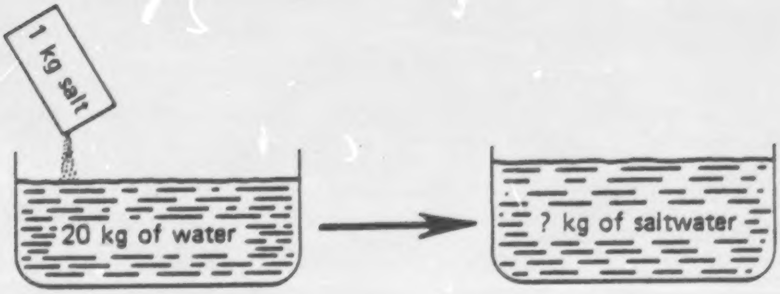
5% 5 ○ I don't know.

NOTE: Item 36 was also administered in Grade 8.

37. A star is most like

7% 1 ○ a comet.
11% 2 ○ a meteor.
3% 3 ○ the Moon.
19% 4 ○ a planet.
*56% 5 ○ the Sun.

2% 6 ○ I don't know.



38. One kilogram of salt is completely dissolved in twenty kilograms of water. The resulting saltwater will weigh

3% 1 ○ nineteen kilograms.
16% 2 ○ twenty kilograms.
*49% 3 ○ twenty-one kilograms.
20% 4 ○ The weight is unpredictable.

12% 5 ○ I don't know.

NOTE: Item 38 was also administered in Grades 4 and 8.

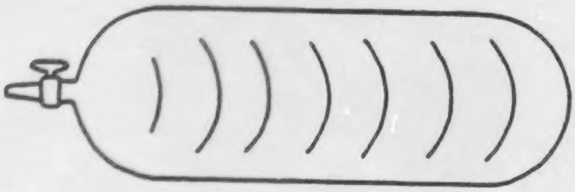
39. The statement that the relative humidity is 50 percent means that

14% 1 ○ the chance of rain is 50 percent.
7% 2 ○ the atmosphere contains 50 pounds of water per cubic mile.
13% 3 ○ the atmosphere contains 50 grams of water per cubic meter.
6% 4 ○ the atmosphere would be saturated with water if the air temperature were 50° F.
*40% 5 ○ the atmosphere contains half as much water as it could contain at its present temperature.

19% 6 ○ I don't know.

NOTE: Item 39 was also administered in Grade 8.

40. An iron container is evacuated and weighed. Then it is filled with hydrogen gas and weighed again.



The weight of the container full of hydrogen compared to the weight of the evacuated container is

21% 1 ○ less.
*30% 2 ○ greater.
21% 3 ○ the same.
13% 4 ○ greater or less depending on the volume of the gas in the container.
7% 5 ○ greater or less depending on the temperature of the gas in the container.

8% 6 ○ I don't know.

---

41. A piece of hot iron is put into some cold water in an insulated container. What information given below is NOT needed to determine how much heat the water gained?

24% 1 ○ mass of the water
7% 2 ○ change in temperature of the water
7% 3 ○ specific heat of the water
*49% 4 ○ density of the water

12% 5 ○ I don't know.

42. Iron combines with oxygen to form rust. One should therefore find that rust weighs

12% 1 ○ the same as the iron it came from.
7% 2 ○ the same as the oxygen it came from.
29% 3 ○ less than the iron it came from.
3% 4 ○ less than the oxygen it came from.
*20% 5 ○ more than the iron it came from.

28% 6 ○ I don't know.

43. At the present time nearly all gasoline comes from

6% 1 ○ coal.
*90% 2 ○ petroleum.
1% 3 ○ water.
0% 4 ○ wood.

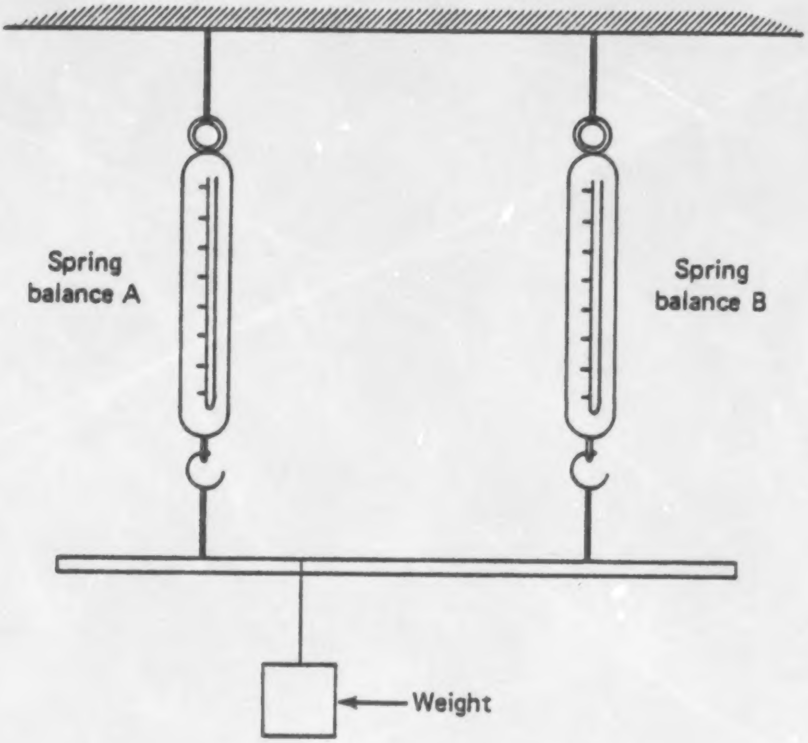
2% 5 ○ I don't know.

44. A metal plate is uncharged. If the plate gains electrons, the plate will

5% 1 ○ be neutral.
*44% 2 ○ be negatively charged.
25% 3 ○ be positively charged.
8% 4 ○ be charged, but one cannot tell how.
5% 5 ○ alternate between being positively and negatively charged.

12% 6 ○ I don't know.

45. Two identical spring balances are arranged as shown. Which spring balance will show the higher reading?


Spring balance A
Spring balance B
Weight

*77% 1 ○ A

9% 2 ○ B

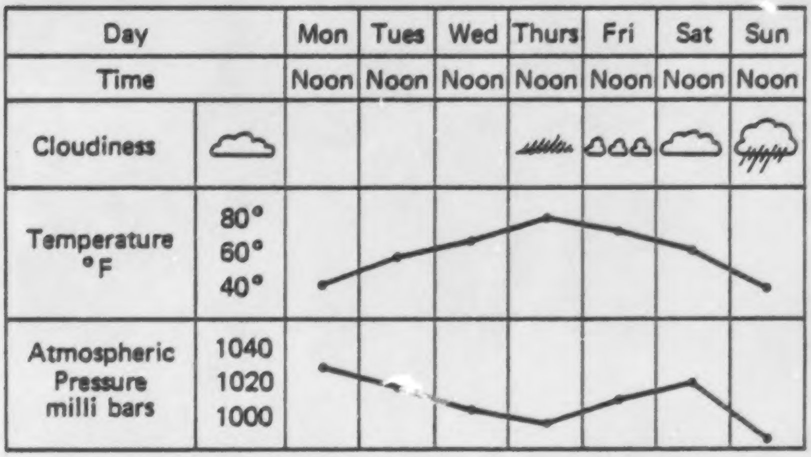
7% 3 ○ Both spring balances will show the same reading.

3% 4 ○ One cannot predict which spring balance will show the higher reading.

2% 5 ○ I don't know.

46. Look at the information in the diagram below and answer the question that follows.

WEATHER DATA FOR SUN CITY



Look at the diagram for the days MONDAY THROUGH THURSDAY. Choose the best description of the relationship between temperature and pressure for those days.

1% 1 ○ As the temperature rose, the pressure remained the same.
1% 2 ○ As the pressure rose, the temperature remained the same.
5% 3 ○ As the pressure rose, the temperature dropped.
*87% 4 ○ As the temperature rose, the pressure dropped.
5% 5 ○ I don't know.

Distance from equator	Highest altitude at which trees can grow
500 miles	12,500 feet
1500 miles	11,500 feet
3000 miles	9,500 feet
4000 miles	4,000 feet

47. Only ONE of the following statements is supported by the data shown in the table above. Which one is it?

*69% 1 ○ The farther you are from the equator, the lower the altitude at which trees can grow.

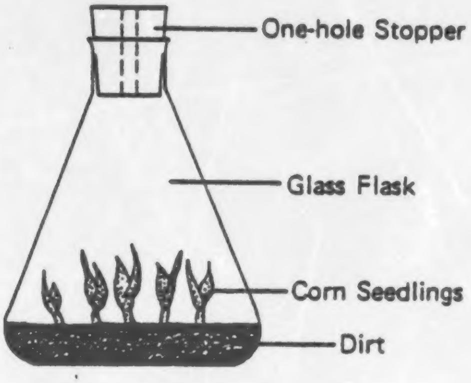
8% 2 ○ The farther you are from the equator, the higher the altitude at which trees can grow.

3% 3 ○ The farther you are from the equator, the taller the trees are.

13% 4 ○ The farther you are from the equator, the smaller the trees are.

7% 5 ○ I don't know.

48. Corn is planted in a flask as shown below. The flask is weighed each day for three weeks. The flask shows a daily weight loss. Which of the following is the best explanation of this loss of weight?



17% 1 ○ The original water evaporates within the first day.
19% 2 ○ Carbon dioxide is lighter in weight than ordinary air.
11% 3 ○ Seed material is changed to leaves and roots that weigh less.
*15% 4 ○ The seedlings use starch in the seeds and give off gases that escape.
17% 5 ○ Dry air enters through the stopper and replaces the moist air in the flask.

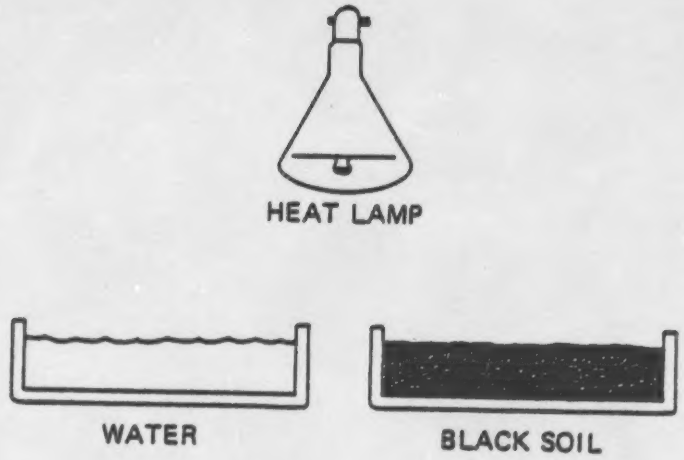
20% 6 ○ I don't know.

49. Whenever scientists carefully measure any quantity many times, they expect that

13% 1 ○ all of the measurements will be exactly the same.
4% 2 ○ only two of the measurements will be exactly the same.
4% 3 ○ all but one of the measurements will be exactly the same.
*74% 4 ○ most of the measurements will be close but not exactly the same.

4% 5 ○ I don't know.

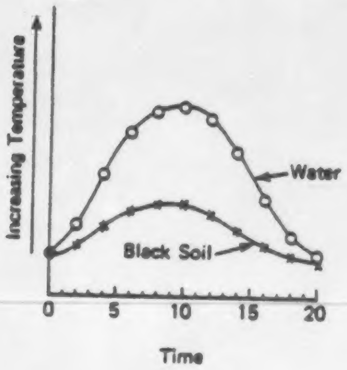
NOTE: Item 49 was also administered in Grade 8.



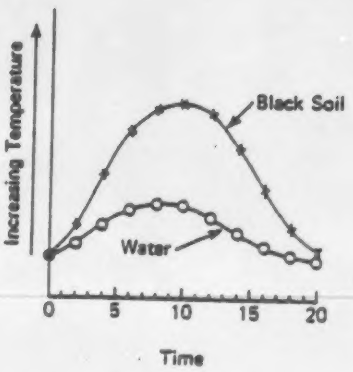
50. The picture shows a heat lamp shining on the two pans. Both the water and the black soil were at the same temperature before the heat lamp was turned on. During the experiment the temperatures of the water and the black soil were recorded every two minutes for a period of 20 minutes. During the 20 minutes the heat lamp was turned on for the first 10 minutes and turned off for the last 10 minutes.

Which one of the following graphs BEST shows the temperature of the black soil and water during the experiment?

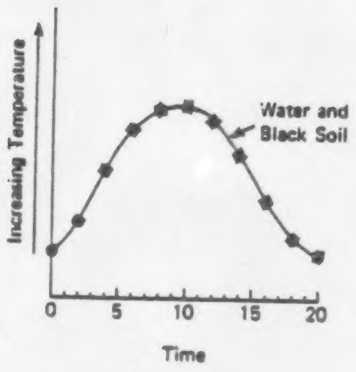
26% 1 ○



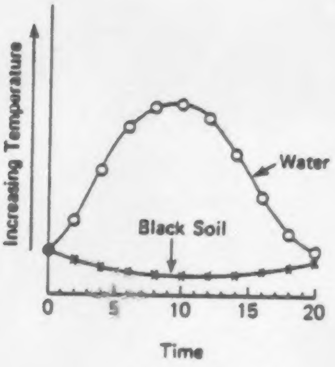
*41% 2 ○



11% 3 ○



7% 4 ○



13% 5 ○ I don't know.

51. Which one of the following is essential in an experiment?

5% 1 ○ making sure measurements can be made quickly
*71% 2 ○ controlling all important variables
3% 3 ○ using new equipment
18% 4 ○ having at least two persons doing the experiment

3% 5 ○ I don't know.

NOTE: Item 51 was also administered in Grade 8.

52. In guinea pigs, fur color is dependent on only one pair of genes and black is dominant over white. If no mutations occur, what will happen if a purebred black guinea pig is crossed with a white guinea pig?

15% 1 ○ 1/2 of the offspring will be black; 1/2 will be white.
34% 2 ○ 3/4 of the offspring will be black; 1/4 will be white.
4% 3 ○ 9/16 of the offspring will be black; 7/16 will be white.
*36% 4 ○ All of the offspring will be black.
1% 5 ○ All of the offspring will be white.

11% 6 ○ I don't know.

53. In a particular meadow there are many rabbits that eat the grass. There are also many hawks that eat the rabbits. Last year a disease broke out among the rabbits and a great number of them died. Which of the following probably then occurred?

6% 1 ○ The grass died and the hawk population decreased.
3% 2 ○ The grass died and the hawk population increased.
*72% 3 ○ The grass grew taller and the hawk population decreased.
3% 4 ○ The grass grew taller and the hawk population increased.
12% 5 ○ Neither the grass nor the hawks were affected by the death of the rabbits.

4% 6 ○ I don't know.

54. For most chemical changes, which of the following most nearly describes what occurs?

4% 1 ○ Atoms are formed from energy.
14% 2 ○ Atoms are converted into energy.
*41% 3 ○ Atoms are rearranged into new molecules.
7% 4 ○ Molecules are formed from energy.
9% 5 ○ Molecules are converted into energy.

24% 6 ○ I don't know.

55. $2\ NO + O_2 \rightleftharpoons 2\ NO_2$

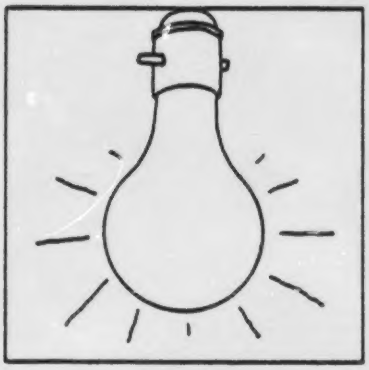
The closed chemical system shown by the equation above is in dynamic equilibrium at a certain temperature and pressure. This means that

3% 1 ○ all molecular activity has stopped.
14% 2 ○ all of the NO and O_2 molecules have reacted to form NO_2.
7% 3 ○ the number of molecules of NO_2 is equal to the number of molecules of NO.
*30% 4 ○ the rate of the reaction from left to right is equal to the rate of the reaction from right to left.
13% 5 ○ the number of molecules of gases on the left in the equation is equal to the number of molecules on the right.

34% 6 ○ I don't know.

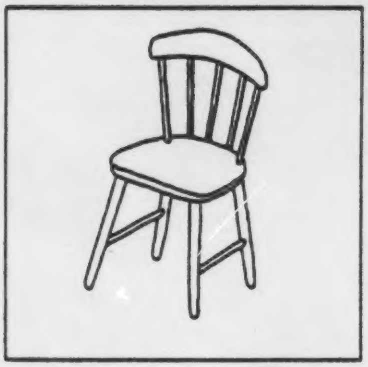
Do the following three illustrations show energy being changed (transformed) from one form to another?

56.



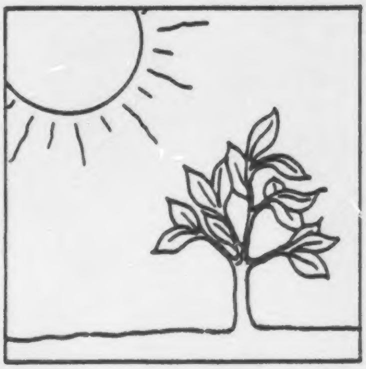
*86% 1 ○ Yes, shows energy change.
10% 2 ○ No, doesn't show energy change.
2% 3 ○ I don't know.

57.



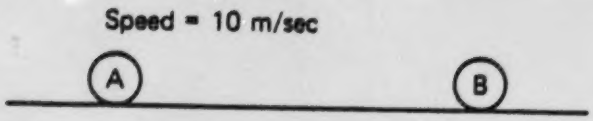
3% 1 ○ Yes, shows energy change.
*94% 2 ○ No, doesn't show energy change.
2% 3 ○ I don't know.

58.



*95% 1 ○ Yes, shows energy change.
2% 2 ○ No, doesn't show energy change.
1% 3 ○ I don't know.

NOTE: Items 56-58 were also administered in Grade 8.



59. Two steel balls of the same size and mass are on a level friction-free surface. At first, ball A is moving to the right at a speed of 10 meters per second and ball B is standing still. Ball A collides head-on with ball B.

Which one of the following describes the speed and direction of ball A after the head-on collision?

*35% 1 ○ Ball A is stopped.
5% 2 ○ Ball A is moving to the left at a speed of 10 meters per second.
9% 3 ○ Ball A is moving to the right at a speed of 10 meters per second.
29% 4 ○ Ball A is moving to the right, but its speed is slightly less than 10 meters per second.
6% 5 ○ Ball A is moving to the left, but its speed is slightly greater than 10 meters per second.

15% 6 ○ I don't know.

60. An object starts from rest and moves with constant acceleration. If the object has a speed of 10 meters per second after 5 seconds, the acceleration of the object is

3% 1 ○ 1 m/sec².
*27% 2 ○ 2 m/sec².
12% 3 ○ 5 m/sec².
10% 4 ○ 10 m/sec².
26% 5 ○ 50 m/sec².

21% 6 ○ I don't know.

61. A motor boat can travel 5 miles per hour on a still lake. If this boat travels downstream on a river that is flowing 5 miles per hour, how long will it take the boat to reach a bridge that is 10 miles downstream?

17% 1 ○ 15 min.
16% 2 ○ 30 min.
7% 3 ○ 45 min.
*45% 4 ○ 60 min.
4% 5 ○ 75 min.

11% 6 ○ I don't know.

62. A 5-pound rock is dropped from a cliff 500 feet high. The longer the rock falls, the greater is its

26% 1 ○ acceleration.
13% 2 ○ potential energy.
*47% 3 ○ speed.
6% 4 ○ total energy.
4% 5 ○ volume.

3% 6 ○ I don't know.

63. What device changes the voltage of an electric power supply?

24% 1 ○ alternator
12% 2 ○ battery
3% 3 ○ rectifier
*47% 4 ○ transformer

12% 5 ○ I don't know.

64. A copper wire carrying an alternating current is placed near the north pole of a magnet, and the wire vibrates. The wire would NOT vibrate

7% 1 ○ if the wire were made of iron.
*18% 2 ○ if the wire were connected to a direct-current source.
4% 3 ○ if the temperature of the wire were raised.
8% 4 ○ if the magnet were moved closer to the wire.
26% 5 ○ if the magnet were reversed so that the south pole would be close to the wire.

36% 6 ○ I don't know.

65. The purpose of a fuse in an electric circuit is

12% 1 ○ to increase the current in the circuit.
17% 2 ○ to increase the voltage across the circuit.
9% 3 ○ to decrease the resistance of the circuit.
*42% 4 ○ to prevent possible damage to the circuit.
2% 5 ○ to raise the temperature of the wires in the circuit.

15% 6 ○ I don't know.

66. What carries sound to your ears from a radio or television receiver 15 feet away?

11% 1 ○ electric currents
*21% 2 ○ molecules of air
12% 3 ○ polarized waves
48% 4 ○ radio waves

6% 5 ○ I don't know.

67. An electric current in a copper wire involves mainly the movement of

10% 1 ○ copper atoms.
14% 2 ○ copper molecules.
*45% 3 ○ electrons.
4% 4 ○ neutrons.
4% 5 ○ protons.

21% 6 ○ I don't know.

68. The idea of natural selection is usually associated with the theory of evolution proposed by

*65% 1 ○ Charles Darwin.
2% 2 ○ Edward Jenner.
3% 3 ○ Jean Lamarck.
6% 4 ○ Louis Pasteur.
1% 5 ○ Jonas Salk.

20% 6 ○ I don't know.

69. In terms of the theory of natural selection, what is the explanation of why giraffes have come to have such long necks?

17% 1 ○ Stretching to get food in high trees has made their necks longer.
3% 2 ○ There is something inside of giraffes which keeps making longer necks.
6% 3 ○ Giraffe food contained vitamins which caused the vertebrae to lengthen.
11% 4 ○ Giraffe necks have gotten longer and longer as time has gone on, but nobody has any idea why this is.
*47% 5 ○ Giraffes born with the longest necks have been able to stay alive when food was scarce and have passed this trait on to their offspring.

14% 6 ○ I don't know.

70. Here is a diagram showing the genes for fur color in guinea pigs.

	Male		Female	
Parents:	EE		ee	
	Brown fur		White fur	
	Female	Female	Male	Male
Offspring:	Ee	Ee	Ee	Ee
	Brown fur	Brown fur	Brown fur	Brown fur

According to the diagram, what kind of trait is brown fur in guinea pigs?

3% 1 ○ recessive
* 69% 2 ○ dominant
13% 3 ○ blended inheritance
5% 4 ○ sex-linked

7% 5 ○ I don't know.

71. One example of oxidation is the

4% 1 ○ setting of concrete.
* 47% 2 ○ burning of wood in air.
8% 3 ○ neutralizing of an acid.
15% 4 ○ dissolving of CO_2 in water.
9% 5 ○ forming of ice from water.

14% 6 ○ I don't know.

72. Which of the following happens when any combustion reaction takes place?

*50% 1 ○ Heat is evolved.
8% 2 ○ Some oxygen is formed.
4% 3 ○ No chemical change occurs.
14% 4 ○ All of the products are gases.
3% 5 ○ Ions are major products formed.

18% 6 ○ I don't know.

73. The picture on a television screen results from

5% 1 ○ atoms striking the screen.
8% 2 ○ x-rays striking the screen.
*21% 3 ○ electrons striking the screen.
50% 4 ○ light rays striking the screen.

13% 5 ○ I don't know.

74. Which of the following can be detected with unaided human eyes?

13% 1 ○ x-rays
4% 2 ○ radio waves
11% 3 ○ television waves
3% 4 ○ the Earth's magnetic field
*57% 5 ○ certain wavelengths of light

8% 6 ○ I don't know.

75. Any galaxy contains many

5% 1 ○ moons.
26% 2 ○ planets.
7% 3 ○ satellites.
*53% 4 ○ stars.
2% 5 ○ winds.

3% 6 ○ I don't know.

APPENDIX B

Copies of Student Questionnaire Instruments

Questions About You

1. Are you a

1 ○ boy?
2 ○ girl?

2. During which month were you born?

1 ○ January
2 ○ February
3 ○ March
4 ○ April
5 ○ May
6 ○ June
7 ○ July
8 ○ August
9 ○ September
10 ○ October
11 ○ November
12 ○ December

3. During which year were you born?

1 ○ 1968
2 ○ 1969
3 ○ 1970
4 ○ 1971
5 ○ 1972

4. How do you feel about science compared to the other things you study in school?

   1 ○ Science is my least favorite.
   2 ○ Science is not one of my favorites.
   3 ○ Science is one of my favorites.
   4 ○ Science is my favorite.

5. Which of the following things do you do most often when you are doing science in school? Be sure to fill in only ONE circle.

   1 ○ work with plants, animals, rocks, and other things related to science
   2 ○ write about science
   3 ○ listen to the teacher talk about science
   4 ○ talk to other children about science
   5 ○ read about science

6. Do you think science will make life better for you and your family?

   1 ○ yes
   2 ○ no

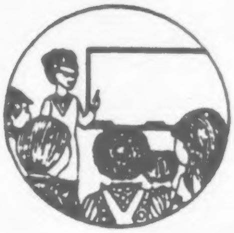
7. Do you have a hobby at home connected with any of the things you study in science?

   1 ○ yes
   2 ○ no

8. How much do you like watching a show about science on television or visiting a science museum?

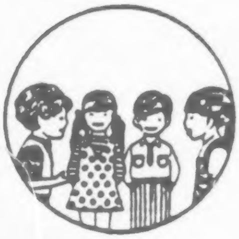
1 ○ I like these very much.
2 ○ I think these are O.K.
3 ○ I don't like these.

The pictures show some activities which might take place in your school as you learn about science. For each activity, please fill in the ONE circle which best shows how much you enjoy that activity.



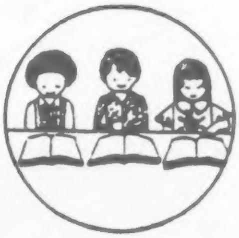
9. Lectures about science

1 ○ I like lectures about science very much.
2 ○ Lectures about science are O.K.
3 ○ I do not like lectures about science.



10. Class discussions of science topics

1 ○ I like class discussions of science topics very much.
2 ○ Class discussions of science topics are O.K.
3 ○ I do not like class discussions of science topics.



11. Reading school books about science

1 ○ I like to read science books very much.
2 ○ Reading science books is O.K.
3 ○ I do not like to read science books.

12. Actually doing experiments, such as working with plants, animals, rocks, and other things related to science

1 ○ I like to do experiments very much.
2 ○ Doing experiments is O.K.
3 ○ I do not like to do experiments.

13. Watching the teacher do experiments such as working with plants, animals, rocks, and other things related to science

1 ○ I like to watch the teacher do experiments very much.
2 ○ Watching the teacher do experiments is O.K.
3 ○ I do not like to watch the teacher do experiments.

14. How hard is science compared to the other things you study in school?

1 ○ Science is easier than most of the other things.
2 ○ Science is about the same as the other things.
3 ○ Science is harder than most of the other things.

15. Do you like to learn about scientists of the past?

1 ○ yes
2 ○ no

Indicate whether you agree, disagree, or are undecided about each of the following statements. Please fill in ONE circle for each statement.

		Agree	Disagree	Undecided
25.	The scientist is willing to let people test or question what he or she believes is true.	1 ○	2 ○	3 ○
26.	Science helps us to control the forces of nature.	1 ○	2 ○	3 ○
27.	Science does NOT tell us right from wrong in our relations with people.	1 ○	2 ○	3 ○
28.	Science has the answers to most of the unsolved problems in our society.	1 ○	2 ○	3 ○
29.	The scientific way of solving problems can be used to solve the problems of human beings.	1 ○	2 ○	3 ○

STOP DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

Questions About You

1. Are you a

1 ○ boy?
2 ○ girl?

2. During which month were you born?

1 ○ January
2 ○ February
3 ○ March
4 ○ April
5 ○ May
6 ○ June
7 ○ July
8 ○ August
9 ○ September
10 ○ October
11 ○ November
12 ○ December

3. During which year were you born?

1 ○ 1964
2 ○ 1965
3 ○ 1966
4 ○ 1967
5 ○ 1968

4. Compared to the other subjects you have studied in school, which one of the following statements best describes your feelings about science?

1 ○ Science is my least favorite subject.
2 ○ Science is not included among my favorite subjects.
3 ○ Science is included among my favorite subjects.
4 ○ Science is my favorite subject.

5. In your science classes, how much of the time do you actually spend on activities such as working with plants and animals, using chemicals, or performing experiments?

1 ○ never or hardly ever
2 ○ once or twice a month
3 ○ once or twice a week
4 ○ just about every day

6. How valuable do you feel the study of science and technology is to society?

1 ○ useless
2 ○ not very valuable
3 ○ valuable
4 ○ very valuable

7. Do you have a hobby at home connected with any of the things you study in science class?

1 ○ yes
2 ○ no

8. How much do you enjoy watching a show about science on television or visiting a museum?

1 ○ I enjoy these very much.
2 ○ I think these are O.K.
3 ○ I don't enjoy these.

Here is a list of activities which might take place in your science class. For EACH activity, please fill in ONE circle which best shows how much you enjoy that activity.

9. Lectures by science teachers

1 ○ I enjoy a lecture by science teachers very much.
2 ○ A lecture by science teachers is O.K.
3 ○ I do not enjoy a lecture by science teachers.

10. Class discussions of science topics

1 ○ I enjoy a class discussion of science topics very much.
2 ○ Class discussion of science topics is O.K.
3 ○ I do not enjoy a class discussion of science topics.

11. Reading assigned books about science

1 ○ I enjoy reading science books very much.
2 ○ Reading science books is O.K.
3 ○ I do not enjoy reading science books.

12. Actually doing laboratory experiments, such as working with plants and animals and using chemicals

1 ○ I enjoy doing laboratory experiments very much.
2 ○ Doing laboratory experiments is O.K.
3 ○ I do not enjoy doing laboratory experiments.

13. Watching the teacher do laboratory experiments, such as working with plants and animals and using chemicals

1 ○ I enjoy watching the teacher do laboratory experiments very much.
2 ○ Watching the teacher do laboratory experiments is O.K.
3 ○ I do not enjoy watching the teacher do laboratory experiments.

14. Compared to the other subjects you have studied in school, how hard is science?

1 ○ Science is easier than most of my other subjects.
2 ○ Science is about the same as my other subjects.
3 ○ Science is harder than most of my other subjects.

15. Do you like to learn about scientists of the past?

1 ○ yes
2 ○ no

16. In your study of science in school, do you use the metric system (kilograms, liters, etc.) or our customary system (pounds, quarts, etc.)?

1 ○ metric system
2 ○ customary system
3 ○ both systems
4 ○ neither system

STOP DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

Questions About You

1. Are you

1 ○ male?
2 ○ female?

2. During which month were you born?

1 ○ January
2 ○ February
3 ○ March
4 ○ April
5 ○ May
6 ○ June
7 ○ July
8 ○ August
9 ○ September
10 ○ October
11 ○ November
12 ○ December

3. During which year were you born?

1 ○ 1960
2 ○ 1961
3 ○ 1962
4 ○ 1963
5 ○ 1964

4. Compared to the other subjects you have studied in school, which one of the following statements best describes your feelings about science?

1 ○ Science is my least favorite subject.
2 ○ Science is not included among my favorite subjects.
3 ○ Science is included among my favorite subjects.
4 ○ Science is my favorite subject.

5. In your science classes, how much of the time do you actually spend on activities such as gathering data, conducting experiments, or using science equipment?

1 ○ never or hardly ever
2 ○ once or twice a month
3 ○ once or twice a week
4 ○ just about every day

6. How valuable do you feel the study of science and technology is to society?

1 ○ useless
2 ○ not very valuable
3 ○ valuable
4 ○ very valuable

7. Do you have a hobby at home connected with any of the things you study in science classes?

1 ○ yes
2 ○ no

8. How much do you enjoy watching a show about science on television or visiting a science museum?

1 ○ I enjoy these very much.
2 ○ I think these are O.K.
3 ○ I don't enjoy these.

Here is a list of activities which might take place in your science classes. For each activity, please fill in ONE circle which best shows how much you enjoy that activity.

		Enjoy very much	They are O.K.	Do not enjoy
9.	Lectures by science teachers	1 ○	2 ○	3 ○
10.	Class discussions of science topics	1 ○	2 ○	3 ○
11.	Reading assigned books about science	1 ○	2 ○	3 ○
12.	Actually working in the laboratory—gathering data, conducting experiments, and using science equipment	1 ○	2 ○	3 ○
13.	Watching the teacher do demonstrations or experiments	1 ○	2 ○	3 ○

14. How valuable do you feel your science courses will be to you after you have finished high school?

1 ○ useless
2 ○ not very valuable
3 ○ valuable
4 ○ very valuable

15. When was the last time you had a science course?

1 ○ two years ago or longer
2 ○ last year
3 ○ I am taking one or more this year.

In grades 9-12, have you had or are you now taking any of the following science courses? Fill in ONE circle beside each course.

		Yes	No	Don't know
16.	General Science	1 ○	2 ○	3 ○
17.	Earth Science	1 ○	2 ○	3 ○
18.	Biology	1 ○	2 ○	3 ○
19.	Chemistry	1 ○	2 ○	3 ○
20.	Physics	1 ○	2 ○	3 ○
21.	Second-Year Biology	1 ○	2 ○	3 ○
22.	Second-Year Chemistry	1 ○	2 ○	3 ○
23.	Second-Year Physics	1 ○	2 ○	3 ○

24. Do you think your school offers a sufficient number or variety of science courses for students of your interest and ability level?

1 ○ yes
2 ○ no

Indicate whether you agree, disagree, or are undecided about each of the following statements. Please fill in ONE circle for each statement.

		Agree	Disagree	Undecided
25.	The scientist is willing to let people test or question what he or she believes is true.	1 ○	2 ○	3 ○
26.	Science helps us to control the forces of nature.	1 ○	2 ○	3 ○
27.	Science does NOT tell us right from wrong in our relations with people.	1 ○	2 ○	3 ○
28.	Science has the answers to most of the unsolved problems in our society.	1 ○	2 ○	3 ○
29.	The scientific way of solving problems can be used to solve the problems of human beings.	1 ○	2 ○	3 ○

STOP **DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.**

APPENDIX C

Tables of Achievement Results by Reporting Groups on Total Test, Goals, and Objectives

KEY FOR APPENDIX C

The analysis by reporting groups provides the following information for the total test and each goal. The P-VALUE is the estimated average percentage of test items answered correctly by students in the population or in the particular reporting group. SE OF P-VALUE is the standard error of measurement for the p-value. GROUP EFFECT is the difference between the state average (all students) and that for the reporting group. An asterisk (*) means that the group effect (the difference) is significant at the 95% confidence level. SE OF EFFECT is the standard error of measurement of the group effect. SAMPLE SIZE is the actual number of students in the reporting group who took the test.

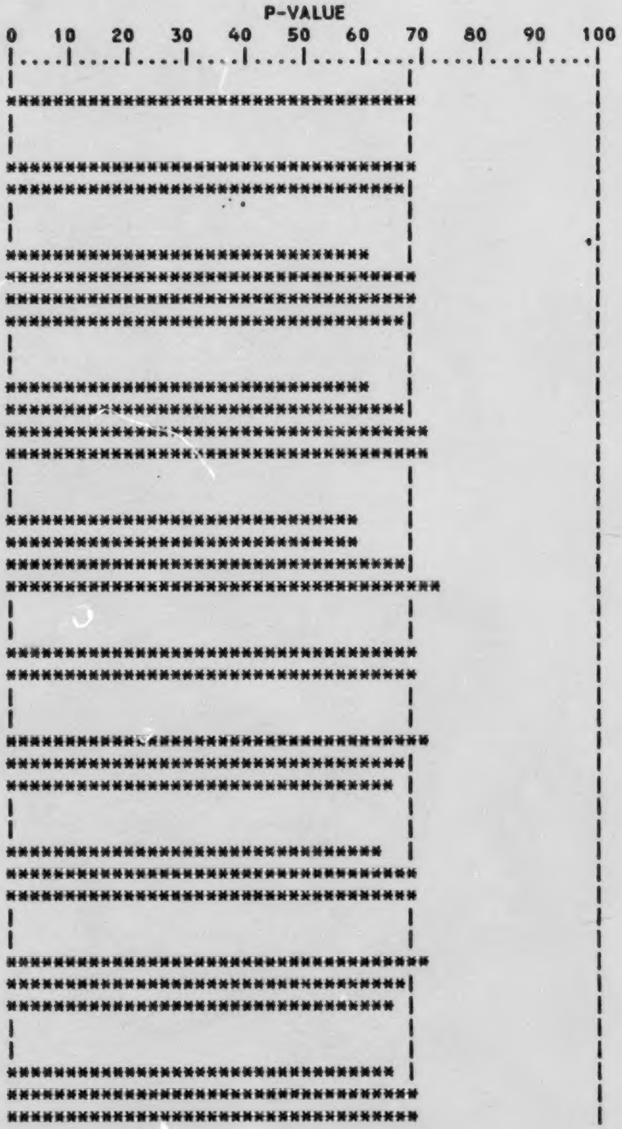
```
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                     CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 4 - WINTER 1980

                        TOTAL SCORE FOR SCIENCE                                        496.
                                                                                                   P-VALUE
          SE OF    GROUP    SE OF  SAMPLE                                    0   10   20   30   40   50   60   70   80   90   100
P-VALUE   P-VALUE EFFECT   EFFECT   SIZE           REPORTING GROUP           |....|....|....|....|....|....|....|....|....|....|
                                                                             |                              |                  |
 61.31     0.81                          2513           ALL STUDENTS              ********************************                  |
                                                                             |                              |                  |
----SEX OF THE STUDENT                      ----                             |                              |                  |
 62.59     0.89   1.27*      0.36   1152           MALE                      ********************************                  |
 60.35     0.86  -0.96*      0.31   1358           FEMALE                    *******************************|                  |
                                                                             |                              |                  |
----HOW DO YOU FEEL ABOUT SCIENCE?          ----                             |                              |                  |
 55.39     1.44  -5.93*      1.09    238           LEAST FAVORITE            *****************************  |                  |
 59.69     1.09  -1.62*      0.74    519           NOT MY FAVORITE           *******************************|                  |
 64.06     0.72   2.75*      0.33   1340           FAVORITE                  *********************************                 |
 58.19     1.35  -3.13*      0.90    412           MOST FAVORITE             ****************************** |                  |
                                                                             |                              |                  |
----WHAT SCIENCE DO MOST OFTEN IN SCHOOL?   ----                             |                              |                  |
 60.76     1.10  -0.56       0.72    588           WORK WITH THINGS          *******************************|                  |
 59.91     1.82  -1.40       1.46    143           WRITE                     *******************************|                  |
 61.14     1.11  -0.17       0.73    644           LISTEN                    ********************************                  |
 58.35     3.06  -2.97       2.84     35           TALK                      ****************************** |                  |
 62.02     0.89   0.71       0.48   1099           READ                      ********************************                  |
                                                                             |                              |                  |
----WILL SCIENCE MAKE LIFE BETTER?          ----                             |                              |                  |
 61.75     0.80   0.44*      0.13   2214           YES                       ********************************                  |
 58.03     1.33  -3.29*      0.96    294           NO                        ****************************** |                  |
                                                                             |                              |                  |
----DO YOU HAVE A SCIENCE HOBBY?            ----                             |                              |                  |
 61.61     1.01   0.29       0.44   1221           YES                       ********************************                  |
 61.08     0.81  -0.23       0.41   1288           NO                        ********************************                  |
                                                                             |                              |                  |
----ENJOY WATCHING SHOW - VISITING MUSEUM?  ----                             |                              |                  |
 63.00     0.99   1.69*      0.48   1113           LIKE                      *********************************                 |
 60.61     0.79  -0.70       0.36   1301           O.K.                      *******************************|                  |
 52.23     2.21  -9.09*      1.87     94           DON'T LIKE                ***************************    |                  |
                                                                             |                              |                  |
----LECTURES BY SCHOOL TEACHERS?            ----                             |                              |                  |
 59.89     1.28  -1.42       0.77    625           LIKE                      *******************************|                  |
 61.95     0.75   0.63*      0.30   1583           O.K.                      ********************************                  |
 61.23     1.23  -0.08       0.90    301           DON'T LIKE                ********************************                  |
                                                                             |                              |                  |
----CLASS DISCUSSION OF SCIENCE TOPICS?     ----                             |                              |                  |
 61.35     0.88   0.03       0.38   1054           LIKE                      ********************************                  |
 62.04     0.84   0.72*      0.32   1265           O.K.                      ********************************                  |
 56.71     1.68  -4.60*      1.33    190           DON'T LIKE                *****************************  |                  |
                                                                             |                              |                  |
----READING ASSIGNED BOOKS ABOUT SCIENCE?   ----                             |                              |                  |
 60.34     1.01  -0.97*      0.44   1227           LIKE                      *******************************|                  |
 62.60     0.83   1.29*      0.49   1021           O.K.                      ********************************                  |
 61.15     1.13  -0.17       0.85    263           DON'T LIKE                ********************************                  |
                                                                             |                              |                  |
----ACTUALLY DOING LABORATORY EXPERIMENTS?  ----                             |                              |                  |
 62.41     0.75   1.09*      0.19   2137           LIKE                      ********************************                  |
 55.00     1.47  -6.31*      1.05    333           O.K.                      *****************************  |                  |
 56.70     3.35  -4.62       3.10     40           DON'T LIKE                *****************************  |                  |
                     NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 4 - WINTER 1980

                       TOTAL SCORE FOR SCIENCE                                                496.
                                                                                         P-VALUE
          SE OF    GROUP    SE OF SAMPLE                                       0    10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE  EFFECT   EFFECT  SIZE         REPORTING GROUP                |....|....|....|....|....|....|....|....|....|....|
                                                                               |                              |                  |
 61.31     0.81                      2513        ALL STUDENTS                  ********************************                  |
                                                                               |                              |                  |
----WATCHING TEACHER DO EXPERIMENTS?        ----                               |                              |                  |
 60.60     0.86    -0.71*    0.33   1315        LIKE                           *******************************|                  |
 62.58     0.83     1.27*    0.42    964        O.K.                           ********************************                  |
 59.72     1.77    -1.59     1.34    215        DON'T LIKE                     *******************************|                  |
                                                                               |                              |                  |
----HOW HARD IS SCIENCE?                    ----                               |                              |                  |
 62.71     0.98     1.40*    0.61    599        EASIER                         ********************************                  |
 62.76     0.76     1.45*    0.29   1538        SAME                           ********************************                  |
 53.29     1.28    -8.02*    0.84    372        HARDER                         ****************************   |                  |
                                                                               |                              |                  |
----LIKE TO LEARN ABOUT PAST SCIENTISTS?    ----                               |                              |                  |
 60.96     0.82    -0.36*    0.17   1995        YES                            *******************************|                  |
 62.91     1.11     1.59*    0.71    514        NO                             ********************************                  |
                                                                               |                              |                  |
----HOW MUCH DO YOU STUDY SCIENCE EACH WEEK?----                               |                              |                  |
 54.36     1.85    -6.95*    1.58    217        NEVER                          ****************************   |                  |
 58.67     1.04    -2.64*    0.75    662        ONCE                           ****************************** |                  |
 63.50     0.99     2.19*    0.84    590        TWICE                          *********************************                 |
 65.49     1.02     4.18*    0.86    441        THREE TIMES                    **********************************                |
 62.15     1.36     0.83     0.99    596        FOUR TIMES-MORE                ********************************                  |
                                                                               |                              |                  |
----DO YOU USE A SPECIAL SCIENCE BOOK?      ----                               |                              |                  |
 61.99     0.91     0.67*    0.33   1673        YES                            ********************************                  |
 60.07     0.99    -1.25     0.68    836        NO                             *******************************|                  |
                                                                               |                              |                  |
----HAVE A SPECIAL PLACE FOR PROJECTS?      ----                               |                              |                  |
 60.45     0.95    -0.87     0.47   1130        YES                            *******************************|                  |
 62.08     0.88     0.77*    0.37   1380        NO                             ********************************                  |
                                                                               |                              |                  |
----SIZE OF COMMUNITY                       ----                               |                              |                  |
 46.02     1.94   -15.29*    1.85    350        BIG CITIES                     ************************       |                  |
 63.77     1.21     2.45*    1.17    642        FRINGE CITIES                  *********************************                 |
 62.02     1.24     0.71     1.22    584        MEDIUM CITIES                  ********************************                  |
 65.72     0.69     4.41*    0.83    937        SMALLER PLACES                 **********************************                |
                                                                               |                              |                  |
----REGION                                  ----                               |                              |                  |
 67.02     1.26     5.71*    1.34    266        RESCUE                         ***********************************               |
 56.87     2.63    -4.44*    2.15    522        COOP ED SERV                   *****************************  |                  |
 62.39     1.37     1.07     1.19    724        CREC                           ********************************                  |
 59.34     1.50    -1.97     1.40    547        ACES                           *******************************|                  |
 65.21     1.11     3.90*    1.26    267        PROJECT LEARN                  **********************************                |
 60.52     1.99    -0.79     2.06    187        HARSES                         *******************************|                  |
                                                                               |                              |                  |
----REGION NOT INCLUDING BIG CITIES         ----                               |                              |                  |
 67.02     1.26     5.71*    1.34    266        RESCUE                         ***********************************               |
 63.11     2.44     1.79     2.18    376        COOP ED SERV                   *********************************                 |
 64.76     0.89     3.44*    1.01    638        CREC                           *********************************                 |
 61.69     1.03     0.38     1.16    429        ACES                           ********************************                  |
 65.21     1.11     3.90*    1.26    267        PROJECT LEARN                  **********************************                |
 60.52     1.99    -0.79     2.06    187        HARSES                         *******************************|                  |
                    NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                  CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 4 - WINTER 1980

                     KNOW THE FUNDAMENTAL FACTS AND PRINCIPALS OF SCIENCE           493.
                                                                                                    P-VALUE
           SE OF     GROUP    SE OF  SAMPLE                                           0    10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE    EFFECT   EFFECT    SIZE          REPORTING GROUP                  |....|....|....|....|....|....|....|....|....|....|
                                                                                      |                                  |              |
 68.97     0.88                        2513          ALL STUDENTS                     ***********************************               |

----SEX OF THE STUDENT                         ----                                   |                                  |              |
 70.94     0.92      1.97*     0.41    1152          MALE                             ************************************              |
 67.42     1.00     -1.55*     0.36    1358          FEMALE                           ***********************************               |
                                                                                      |                                  |              |
----HOW DO YOU FEEL ABOUT SCIENCE?             ----                                   |                                  |              |
 63.45     1.72     -5.52*     1.33     238          LEAST FAVORITE                   *********************************  |              |
 67.26     1.23     -1.71*     0.84     519          NOT MY FAVORITE                  ***********************************               |
 71.49     0.81      2.52*     0.41    1340          FAVORITE                         *************************************             |
 66.46     1.58     -2.51*     1.13     412          MOST FAVORITE                    ********************************** |              |
                                                                                      |                                  |              |
----WHAT SCIENCE DO MOST OFTEN IN SCHOOL?      ----                                   |                                  |              |
 67.50     1.19     -1.47      0.88     588          WORK WITH THINGS                 ***********************************               |
 67.32     1.97     -1.65      1.41     143          WRITE                            ***********************************               |
 68.87     1.36     -0.11      0.93     644          LISTEN                           ***********************************               |
 66.89     4.16     -2.08      3.96      35          TALK                             ********************************** |              |
 70.14     0.99      1.17*     0.56    1029          READ                             ************************************              |
                                                                                      |                                  |              |
----WILL SCIENCE MAKE LIFE BETTER?             ----                                   |                                  |              |
 69.46     0.86      0.49*     0.16    2214          YES                              ************************************              |
 65.38     1.59     -3.59*     1.15     294          NO                               ********************************** |              |
                                                                                      |                                  |              |
----DO YOU HAVE A SCIENCE HOBBY?               ----                                   |                                  |              |
 69.74     1.11      0.77      0.52    1221          YES                              ************************************              |
 68.33     0.92     -0.64      0.47    1288          NO                               ***********************************               |
                                                                                      |                                  |              |
----ENJOY WATCHING SHOW - VISITING MUSEUM?     ----                                   |                                  |              |
 70.45     1.10      1.48*     0.52    1113          LIKE                             ************************************              |
 68.52     0.85     -0.45      0.41    1301          O.K.                             ***********************************               |
 58.82     2.87    -10.15*     2.53      94          DON'T LIKE                       ******************************     |              |
                                                                                      |                                  |              |
----LECTURES BY SCHOOL TEACHERS?               ----                                   |                                  |              |
 67.43     1.37     -1.54      0.85     625          LIKE                             ***********************************               |
 69.59     0.84      0.62      0.32    1583          O.K.                             ************************************              |
 69.13     1.44      0.16      1.08     301          DON'T LIKE                       ************************************              |
                                                                                      |                                  |              |
----CLASS DISCUSSION OF SCIENCE TOPICS?        ----                                   |                                  |              |
 68.62     0.99     -0.35      0.49    1054          LIKE                             ***********************************               |
 70.05     0.94      1.08*     0.40    1265          O.K.                             ************************************              |
 64.12     1.95     -4.85*     1.58     190          DON'T LIKE                       *********************************  |              |
                                                                                      |                                  |              |
----READING ASSIGNED BOOKS ABOUT SCIENCE?      ----                                   |                                  |              |
 67.80     1.09     -1.17*     0.55    1227          LIKE                             ***********************************               |
 70.40     0.97      1.43*     0.60    1021          O.K.                             ************************************              |
 69.16     1.46      0.19      1.12     263          DON'T LIKE                       ************************************              |
                                                                                      |                                  |              |
----ACTUALLY DOING LABORATORY EXPERIMENTS?     ----                                   |                                  |              |
 70.03     0.83      1.06*     0.23    2137          LIKE                             ************************************              |
 62.96     1.78     -6.01*     1.33     333          O.K.                             ********************************   |              |
 64.69     4.17     -4.28      4.00      40          DON'T LIKE                       *********************************  |              |
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                     CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 4 - WINTER 1980

                        KNOW THE FUNDAMENTAL FACTS AND PRINCIPALS OF SCIENCE           493.
                                                                                                   P-VALUE
          SE OF    GROUP    SE OF  SAMPLE                                    0   10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE  EFFECT   EFFECT   SIZE           REPORTING GROUP           |....|....|....|....|....|....|....|....|....|....|
                                                                             |                                  |              |
 68.97     0.88                     2513           ALL STUDENTS              ************************************              |
                                                                             |                                  |              |
----WATCHING TEACHER DO EXPERIMENTS?        ----                             |                                  |              |
 68.19     0.93    -0.78     0.42   1315           LIKE                      ************************************              |
 70.35     0.99     1.38*    0.50    964           O.K.                      *************************************             |
 67.72     1.93    -1.25     1.45    215           DON'T LIKE                ************************************              |
                                                                             |                                  |              |
----HOW HARD IS SCIENCE?                    ----                             |                                  |              |
 70.28     1.00     1.31     0.76    599           EASIER                    *************************************             |
 70.10     0.90     1.13*    0.36   1538           SAME                      *************************************             |
 62.44     1.61    -6.53*    1.08    372           HARDER                    *********************************  |              |
                                                                             |                                  |              |
----LIKE TO LEARN ABOUT PAST SCIENTISTS?    ----                             |                                  |              |
 68.91     0.90    -0.06     0.23   1995           YES                       ************************************              |
 69.45     1.37     0.48     0.97    514           NO                        *************************************             |
                                                                             |                                  |              |
----HOW MUCH DO YOU STUDY SCIENCE EACH WEEK?----                             |                                  |              |
 61.01     1.84    -7.96*    1.63    217           NEVER                     *********************************  |              |
 66.04     1.15    -2.93*    0.84    662           ONCE                      ***********************************|              |
 70.92     1.10     1.95*    0.90    590           TWICE                     *************************************             |
 73.44     1.17     4.47*    0.99    441           THREE TIMES               ***************************************           |
 70.49     1.47     1.52     1.06    596           FOUR TIMES-MORE           *************************************             |
                                                                             |                                  |              |
----DO YOU USE A SPECIAL SCIENCE BOOK?      ----                             |                                  |              |
 69.91     0.98     0.94*    0.40   1673           YES                       *************************************             |
 67.18     1.16    -1.79*    0.80    836           NO                        ************************************              |
                                                                             |                                  |              |
----HAVE A SPECIAL PLACE FOR PROJECTS?      ----                             |                                  |              |
 68.27     1.03    -0.70     0.54   1130           YES                       ************************************              |
 69.61     0.99     0.64     0.43   1380           NO                        *************************************             |
                                                                             |                                  |              |
----SIZE OF COMMUNITY                       ----                             |                                  |              |
 53.74     2.14   -15.23*    2.04    350           BIG CITIES                *****************************      |              |
 70.06     1.49     1.09     1.38    642           FRINGE CITIES             *************************************             |
 70.38     1.54     1.41     1.43    584           MEDIUM CITIES             *************************************             |
 73.76     0.85     4.79*    0.92    937           SMALLER PLACES            ***************************************           |
                                                                             |                                  |              |
----REGION                                  ----                             |                                  |              |
 74.94     1.31     5.97*    1.42    266           RESCUE                    ***************************************           |
 63.54     2.72    -5.43*    2.24    522           COOP ED SERV              ********************************** |              |
 69.79     1.58     0.82     1.34    724           CREC                      *************************************             |
 67.29     1.75    -1.68     1.59    547           ACES                      ************************************              |
 73.71     1.43     4.74*    1.51    267           PROJECT LEARN             ***************************************           |
 70.43     1.29     1.46     1.51    187           NARSES                    *************************************             |
                                                                             |                                  |              |
----REGION NOT INCLUDING BIG CITIES         ----                             |                                  |              |
 74.94     1.31     5.97*    1.42    266           RESCUE                    ***************************************           |
 69.17     2.86     0.20     2.53    376           COOP ED SERV              *************************************             |
 72.19     1.23     3.22*    1.23    638           CREC                      **************************************            |
 69.73     1.39     0.76     1.44    429           ACES                      *************************************             |
 73.71     1.43     4.74*    1.51    267           PROJECT LEARN             ***************************************           |
 70.43     1.29     1.46     1.51    187           NARSES                    *************************************             |
                 NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
               CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 4 - WINTER 1980

                  APPLY THE FUNDAMENTAL PRINCIPALS OF SCIENCE                       494.
                                                                                              P-VALUE
             SE OF     GROUP    SE OF  SAMPLE                                 0    10   20   30   40   50   60   70   80   90   100
  P-VALUE   P-VALUE    EFFECT   EFFECT  SIZE         REPORTING GROUP          |....|....|....|....|....|....|....|....|....|....|
                                                                              |                        |                        |
  51.99     0.79                        2513         ALL STUDENTS             **************************                        |
                                                                              |                        |                        |
  ----SEX OF THE STUDENT                                         ----         |                        |                        |
  53.98     0.90     2.00*    0.38      1152         MALE                     ***************************                       |
  50.41     0.83    -1.58*    0.32      1358         FEMALE                   *************************|                        |
                                                                              |                        |                        |
  ----HOW DO YOU FEEL ABOUT SCIENCE?                             ----         |                        |                        |
  45.74     1.39    -6.24*    1.08       238         LEAST FAVORITE           ***********************  |                        |
  50.10     1.08    -1.88*    0.75       519         NOT MY FAVORITE          *************************|                        |
  54.62     0.75     2.64*    0.32      1340         FAVORITE                 ***************************                       |
  49.78     1.28    -2.20*    0.88       412         MOST FAVORITE            *************************|                        |
                                                                              |                        |                        |
  ----WHAT SCIENCE DO MOST OFTEN IN SCHOOL?                      ----         |                        |                        |
  51.97     1.06    -0.01     0.73       588         WORK WITH THINGS         **************************                        |
  51.42     1.94    -0.57     1.61       143         WRITE                    **************************                        |
  51.32     1.08    -0.67     0.74       644         LISTEN                   **************************                        |
  47.85     3.10    -4.13     2.89        35         TALK                     ************************ |                        |
  52.59     0.90     0.60     0.48      1099         READ                     **************************                        |
                                                                              |                        |                        |
  ----WILL SCIENCE MAKE LIFE BETTER?                             ----         |                        |                        |
  52.40     0.79     0.41*    0.14      2214         YES                      **************************                        |
  48.86     1.33    -3.12*    1.00       294         NO                       ************************ |                        |
                                                                              |                        |                        |
  ----DO YOU HAVE A SCIENCE HOBBY?                               ----         |                        |                        |
  52.43     1.01     0.45     0.44      1221         YES                      **************************                        |
  51.60     0.79    -0.38     0.41      1288         NO                       **************************                        |
                                                                              |                        |                        |
  ----ENJOY WATCHING SHOW - VISITING MUSEUM?                     ----         |                        |                        |
  54.22     0.96     2.23*    0.46      1113         LIKE                     ***************************                       |
  50.74     0.79    -1.25*    0.35      1301         O.K.                     *************************|                        |
  43.77     2.17    -8.21*    1.86        94         DON'T LIKE               **********************   |                        |
                                                                              |                        |                        |
  ----LECTURES BY SCHOOL TEACHERS?                               ----         |                        |                        |
  51.08     1.20    -0.90     0.75       625         LIKE                     **************************                        |
  52.41     0.78     0.42     0.30      1583         O.K.                     **************************                        |
  51.96     1.28    -0.02     0.97       301         DON'T LIKE               **************************                        |
                                                                              |                        |                        |
  ----CLASS DISCUSSION OF SCIENCE TOPICS?                        ----         |                        |                        |
  52.05     0.87     0.06     0.39      1054         LIKE                     **************************                        |
  52.51     0.86     0.53     0.34      1265         O.K.                     **************************                        |
  48.51     1.52    -3.48*    1.26       190         DON'T LIKE               ************************ |                        |
                                                                              |                        |                        |
  ----READING ASSIGNED BOOKS ABOUT SCIENCE?                      ----         |                        |                        |
  51.32     0.99    -0.67     0.45      1227         LIKE                     **************************                        |
  52.92     0.87     0.93     0.49      1021         O.K.                     **************************                        |
  51.73     1.19    -0.25     0.99       263         DON'T LIKE               **************************                        |
                                                                              |                        |                        |
  ----ACTUALLY DOING LABORATORY EXPERIMENTS?                     ----         |                        |                        |
  53.07     0.74     1.08*    0.19      2137         LIKE                     ***************************                       |
  45.63     1.40    -6.36*    0.98       333         O.K.                     ***********************  |                        |
  47.99     3.20    -3.99     2.96        40         DON'T LIKE               ************************ |                        |
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                     CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 4 - WINTER 1980

                        APPLY THE FUNDAMENTAL PRINCIPALS OF SCIENCE                    494.
                                                                                                   P-VALUE
          SE OF    GROUP    SE OF  SAMPLE                                    0    10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE  EFFECT   EFFECT   SIZE           REPORTING GROUP           |....|....|....|....|....|....|....|....|....|....|
                                                                             |                        |                        |
 51.99     0.79                     2513           ALL STUDENTS              **************************                        |
                                                                             |                        |                        |
----WATCHING TEACHER DO EXPERIMENTS?        ----                             |                        |                        |
 51.21     0.85    -0.77*    0.34   1315           LIKE                      **************************                        |
 53.09     0.85     1.10*    0.43    964           O.K.                      ***************************                       |
 51.22     1.76    -0.77     1.40    215           DON'T LIKE                **************************                        |
                                                                             |                        |                        |
----HOW HARD IS SCIENCE?                    ----                             |                        |                        |
 53.75     1.02     1.76*    0.62    599           EASIER                    ***************************                       |
 53.23     0.77     1.25*    0.28   1538           SAME                      ***************************                       |
 44.24     1.14    -7.75*    0.82    372           HARDER                    **********************   |                        |
                                                                             |                        |                        |
----LIKE TO LEARN ABOUT PAST SCIENTISTS?    ----                             |                        |                        |
 51.61     0.80    -0.38*    0.17   1995           YES                       **************************                        |
 53.65     1.11     1.66*    0.71    514           NO                        ***************************                       |
                                                                             |                        |                        |
----HOW MUCH DO YOU STUDY SCIENCE EACH WEEK?----                             |                        |                        |
 45.84     1.83    -6.14*    1.60    217           NEVER                     ***********************  |                        |
 49.06     1.01    -2.92*    0.73    662           ONCE                      *************************|                        |
 54.29     1.03     2.30*    0.85    590           TWICE                     ***************************                       |
 55.86     1.15     3.87*    0.96    441           THREE TIMES               ****************************                      |
 52.96     1.32     0.97     0.97    596           FOUR TIMES-MORE           **************************                        |
                                                                             |                        |                        |
----DO YOU USE A SPECIAL SCIENCE BOOK?      ----                             |                        |                        |
 52.67     0.92     0.68*    0.33   1673           YES                       **************************                        |
 50.75     0.93    -1.24     0.68    836           NO                        *************************|                        |
                                                                             |                        |                        |
----HAVE A SPECIAL PLACE FOR PROJECTS?      ----                             |                        |                        |
 51.35     0.94    -0.64     0.47   1130           YES                       **************************                        |
 52.57     0.86     0.59     0.37   1380           NO                        **************************                        |
                                                                             |                        |                        |
----SIZE OF COMMUNITY                       ----                             |                        |                        |
 37.39     1.62   -14.60*    1.58    350           BIG CITIES                *******************      |                        |
 54.77     1.31     2.79*    1.21    642           FRINGE CITIES             ***************************                       |
 52.40     1.17     0.42     1.16    584           MEDIUM CITIES             **************************                        |
 56.07     0.77     4.09*    0.86    93[illegible]           SMALLER PLACES            ****************************                      |
                                                                             |                        |                        |
----REGION                                  ----                             |                        |                        |
 57.73     1.50     5.75*    1.50    266           RESCUE                    *****************************                     |
 48.67     2.46    -3.32     2.02    522           COOP ED SERV              ************************ |                        |
 52.33     1.39     0.35     1.19    724           CREC                      **************************                        |
 49.72     1.47    -2.26     1.37    547           ACES                      *************************|                        |
 56.16     1.14     4.18*    1.26    267           PROJECT LEARN.            ****************************                      |
 51.02     2.18    -0.97     2.23    187           NARSES                    **************************                        |
                                                                             |                        |                        |
----REGION NOT INCLUDING BIG CITIES         ----                             |                        |                        |
 57.73     1.50     5.75*    1.50    266           RESCUE                    *****************************                     |
 54.54     2.26     2.55     2.05    376           COOP ED SERV              ***************************                       |
 54.69     0.92     2.70*    1.02    638           CREC                      ***************************                       |
 51.98     1.28    -0.01     1.31    429           ACES                      **************************                        |
 56.16     1.14     4.18*    1.26    267           PROJECT LEARN             ****************************                      |
 51.02     2.18    -0.97     2.23    187           NARSES                    **************************                        |
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                     CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 4 - WINTER 1980

                        UNDERSTAND AND APPLY THE PROCESSES OF SCIENCE                         495.
                                                                                                    P-VALUE
          SE OF    GROUP    SE OF   SAMPLE                                            0   10   20   30   40   50   60   70   80   90   100
 P-VALUE  P-VALUE  EFFECT   EFFECT   SIZE          REPORTING GROUP                    |....|....|....|....|....|....|....|....|....|....|
                                                                              |                                 |               |
  68.66    0.88                     2513          ALL STUDENTS                ***********************************               |
                                                                              |                                 |               |
  ----SEX OF THE STUDENT                    ----                              |                                 |               |
  68.51    1.00    -0.17     0.44   1152          MALE                        ***********************************               |
  68.94    0.95     0.26     0.38   1358          FEMALE                      ***********************************               |
                                                                              |                                 |               |
  ----HOW DO YOU FEEL ABOUT SCIENCE?        ----                              |                                 |               |
  62.95    1.79    -5.73*    1.42    238          LEAST FAVORITE              ********************************  |               |
  67.38    1.28    -1.30     0.91    519          NOT MY FAVORITE             ***********************************               |
  71.73    0.78     3.05*    0.40   1340          FAVORITE                    *************************************             |
  63.97    1.54    -4.71*    1.05    412          MOST FAVORITE               ********************************* |               |
                                                                              |                                 |               |
  ----WHAT SCIENCE DO MOST OFTEN IN SCHOOL? ----                              |                                 |               |
  68.04    1.35    -0.64     0.87    588          WORK WITH THINGS            ***********************************               |
  66.28    2.12    -2.40     1.75    143          WRITE                       **********************************|               |
  69.10    1.20     0.42     0.81    644          LISTEN                      ************************************              |
  66.79    3.48    -1.89     3.28     35          TALK                        **********************************|               |
  69.20    0.95     0.52     0.58   1099          READ                        ************************************              |
                                                                              |                                 |               |
  ----WILL SCIENCE MAKE LIFE BETTER?        ----                              |                                 |               |
  69.14    0.87     0.46*    0.16   2214          YES                         ************************************              |
  65.26    1.61    -3.42*    1.21    294          NO                          **********************************|               |
                                                                              |                                 |               |
  ----DO YOU HAVE A SCIENCE HOBBY?          ----                              |                                 |               |
  68.45    1.09    -0.23     0.51   1221          YES                         ***********************************               |
  68.92    0.93     0.24     0.47   1288          NO                          ***********************************               |
                                                                              |                                 |               |
  ----ENJOY WATCHING SHOW - VISITING MUSEUM?  ----                            |                                 |               |
  69.77    1.10     1.09     0.59   1113          LIKE                        ************************************              |
  68.54    0.92    -0.13     0.47   1301          O.K.                        ***********************************               |
  59.12    2.63    -9.56*    2.31     94          DON'T LIKE                  *******************************   |               |
                                                                              |                                 |               |
  ----LECTURES BY SCHOOL TEACHERS?          ----                              |                                 |               |
  66.69    1.47    -1.99*    0.90    625          LIKE                        **********************************|               |
  69.58    0.81     0.90*    0.37   1583          O.K.                        ************************************              |
  68.36    1.45    -0.32     1.11    301          DON'T LIKE                  ***********************************               |
                                                                              |                                 |               |
  ----CLASS DISCUSSION OF SCIENCE TOPICS?   ----                              |                                 |               |
  68.93    1.01     0.25     0.49   1054          LIKE                        ***********************************               |
  69.42    0.91     0.74     0.40   1265          O.K.                        ************************************              |
  62.79    2.05    -5.89*    1.65    190          DON'T LIKE                  ********************************  |               |
                                                                              |                                 |               |
  ----READING ASSIGNED BOOKS ABOUT SCIENCE?   ----                            |                                 |               |
  67.45    1.11    -1.23*    0.51   1227          LIKE                        ***********************************               |
  70.33    0.90     1.66*    0.57   1021          O.K.                        ************************************              |
  68.33    1.43    -0.35     1.08    263          DON'T LIKE                  ***********************************               |
                                                                              |                                 |               |
  ----ACTUALLY DOING LABORATORY EXPERIMENTS?  ----                            |                                 |               |
  69.82    0.84     1.14*    0.22   2137          LIKE                        ************************************              |
  62.20    1.66    -6.47*    1.28    333          O.K.                        ********************************  |               |
  62.95    3.90    -5.73     3.70     40          DON'T LIKE                  ********************************  |               |
                     NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                   CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 4 - WINTER 1980

                        UNDERSTAND AND APPLY THE PROCESSES OF SCIENCE                495.
                                                                                                P-VALUE
               SE OF    GROUP     SE OF  SAMPLE                                    0    10   20   30   40   50   60   70   80   90   100
 P-VALUE    P-VALUE    EFFECT    EFFECT   SIZE          REPORTING GROUP            |....|....|....|....|....|....|....|....|....|....|
                                                                                   |                                 |               |
 68.68     0.88                            2513          ALL STUDENTS              ***********************************               |
                                                                                   |                                 |               |
----WATCHING TEACHER DO EXPERIMENTS?          ----                                 |                                 |               |
 68.08     0.99    -0.59      0.41         1315          LIKE                      ***********************************               |
 70.10     0.92     1.42*     0.55          964          O.K.                      ************************************              |
 65.82     2.10    -2.86      1.65          215          DON'T LIKE                **********************************|               |
                                                                                   |                                 |               |
----HOW HARD IS SCIENCE?                      ----                                 |                                 |               |
 69.69     1.12     1.01      0.75          599          EASIER                    ************************************              |
 70.59     0.81     1.91*     0.36         1538          SAME                      ************************************              |
 59.27     1.58    -9.41*     1.05          372          HARDER                    *******************************   |               |
                                                                                   |                                 |               |
----LIKE TO LEARN ABOUT PAST SCIENTISTS?      ----                                 |                                 |               |
 68.15     0.91    -0.53*     0.21         1995          YES                       ***********************************               |
 70.91     1.26     2.23*     0.89          514          NO                        ************************************              |
                                                                                   |                                 |               |
----HOW MUCH DO YOU STUDY SCIENCE EACH WEEK?----                                   |                                 |               |
 61.23     2.22    -7.44*     1.85          217          NEVER                     ********************************  |               |
 66.64     1.31    -2.04*     0.96          662          ONCE                      **********************************|               |
 70.87     1.14     2.19*     1.00          590          TWICE                     ************************************              |
 73.10     1.10     4.42*     0.99          441          THREE TIMES               **************************************            |
 68.84     1.52     0.16      1.16          596          FOUR TIMES-MORE           ***********************************               |
                                                                                   |                                 |               |
----DO YOU USE A SPECIAL SCIENCE BOOK?        ----                                 |                                 |               |
 69.18     0.97     0.50      0.39         1673          YES                       ************************************              |
 67.74     1.17    -0.94      0.78          836          NO                        ***********************************               |
                                                                                   |                                 |               |
----HAVE A SPECIAL PLACE FOR PROJECTS?        ----                                 |                                 |               |
 67.38     1.07    -1.30*     0.56         1130          YES                       ***********************************               |
 69.78     0.98     1.10*     0.44         1380          NO                        ************************************              |
                                                                                   |                                 |               |
----SIZE OF COMMUNITY                         ----                                 |                                 |               |
 52.47     2.49   -16.21*     2.31          350          BIG CITIES                ***************************       |               |
 71.56     1.17     2.88*     1.20          642          FRINGE CITIES             *************************************             |
 69.31     1.36     0.63      1.34          584          MEDIUM CITIES             ************************************              |
 73.25     0.83     4.57*     0.92          937          SMALLER PLACES            **************************************            |
                                                                                   |                                 |               |
----REGION                                    ----                                 |                                 |               |
 74.17     1.21     5.49*     1.38          266          RESCUE                    **************************************            |
 63.40     2.89    -5.28*     2.36          522          COOP ED SERV              ********************************* |               |
 70.89     1.45     2.21      1.27          724          CREC                      ************************************              |
 66.93     1.76    -1.75      1.60          547          ACES                      **********************************|               |
 71.62     1.32     2.94*     1.44          267          PROJECT LEARN             *************************************             |
 66.52     2.78    -2.16      2.79          187          NARSES                    **********************************|               |
                                                                                   |                                 |               |
----REGION NOT INCLUDING BIG CITIES           ----                                 |                                 |               |
 74.17     1.21     5.49*     1.38          266          RESCUE                    **************************************            |
 70.50     2.52     1.83      2.27          376          COOP ED SERV              ************************************              |
 73.24     1.02     4.56*     1.13          638          CREC                      **************************************            |
 69.35     1.16     0.67      1.29          429          ACES                      ************************************              |
 71.62     1.32     2.94*     1.44          267          PROJECT LEARN             *************************************             |
 66.52     2.78    -2.16      2.79          187          NARSES                    **********************************|               |
                          NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                        CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 8 - FALL 1979

                        TOTAL SCORE FOR SCIENCE
                                                                                                   P-VALUE
          SE OF     GROUP     SE OF  SAMPLE                                  0    10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE    EFFECT    EFFECT   SIZE        REPORTING GROUP           |....|....|....|....|....|....|....|....|....|....|
                                                                             |                              |                  |
 62.21     0.87                         2612           ALL STUDENTS              ********************************                  |
                                                                             |                              |                  |
----SEX OF THE STUDENT                        ----                           |                              |                  |
 65.10     0.88     2.89*    0.33   1206           MALE                      **********************************                |
 59.65     0.95    -2.56*    0.29   1388           FEMALE                    *******************************|                  |
                                                                             |                              |                  |
----HOW DO YOU FEEL ABOUT SCIENCE?            ----                           |                              |                  |
 53.11     1.29    -9.10*    0.91    268           LEAST FAVORITE            ****************************   |                  |
 61.49     0.75    -0.72     0.72    766           NOT MY FAVORITE           ********************************                  |
 64.30     1.00     2.09*    0.34   1346           FAVORITE                  *********************************                 |
 62.69     2.41     0.48     1.83    213           MOST FAVORITE             ********************************                  |
                                                                             |                              |                  |
----TIME SPENT ON ACTIVITIES?                 ----                           |                              |                  |
 56.29     1.13    -5.92*    0.92    456           HARDLY EVER               *****************************  |                  |
 61.50     1.27     0.71     0.91    440           MONTHLY                   ********************************                  |
 64.16     0.83     1.95*    0.44   1071           WEEKLY                    *********************************                 |
 63.39     1.33     1.18     0.83    626           DAILY                     *********************************                 |
                                                                             |                              |                  |
----HOW VALUABLE IS THE STUDY OF SCIENCE?     ----                           |                              |                  |
 49.66     2.03   -12.54*    1.95     26           USELESS                   **************************     |                  |
 51.08     1.53   -11.13*    1.08    229           NOT VALUABLE              ***************************    |                  |
 60.20     0.96    -2.01*    0.32   1251           VALUABLE                  *******************************|                  |
 67.11     0.80     4.90*    0.36   1087           VERY VALUABLE             ***********************************               |
                                                                             |                              |                  |
----DO YOU HAVE A SCIENCE HOBBY?              ----                           |                              |                  |
 64.10     1.18     1.89*    0.58    653           YES                       *********************************                 |
 61.49     0.84    -0.72*    0.19   1939           NO                        ********************************                  |
                                                                             |                              |                  |
----ENJOY WATCHING SHOW - VISITING MUSEUM?    ----                           |                              |                  |
 67.04     1.41     4.84*    0.79    670           ENJOY                     ***********************************               |
 60.91     0.91    -1.30*    0.26   1627           O.K.                      *******************************|                  |
 58.03     0.93    -4.18*    0.92    293           DON'T ENJOY               ****************************** |                  |
                                                                             |                              |                  |
----LECTURES BY SCHOOL TEACHERS?              ----                           |                              |                  |
 58.37     4.20    -3.84     3.59    147           ENJOY                     ****************************** |                  |
 62.44     0.92     0.23     0.34   1202           O.K.                      ********************************                  |
 62.34     0.72     0.13     0.53   1244           DON'T ENJOY               ********************************                  |
                                                                             |                              |                  |
----CLASS DISCUSSION OF SCIENCE TOPICS?       ----                           |                              |                  |
 65.05     1.20     2.85*    0.59    771           ENJOY                     **********************************                |
 61.43     0.88    -0.78*    0.23   1608           O.K.                      ********************************                  |
 57.46     1.22    -4.74*    1.11    212           DON'T ENJOY               ****************************** |                  |
                                                                             |                              |                  |
----READING ASSIGNED BOOKS ABOUT SCIENCE?     ----                           |                              |                  |
 59.28     2.37    -2.93     1.79    282           ENJOY                     *******************************|                  |
 62.33     0.96     0.12     0.36   1261           O.K.                      ********************************                  |
 62.73     0.74     0.52     0.58   1049           DON'T ENJOY               ********************************                  |
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                     CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 8 - FALL 1979

                        TOTAL SCORE FOR SCIENCE
                                                                                                   P-VALUE
          SE OF    GROUP    SE OF  SAMPLE                                    0    10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE  EFFECT   EFFECT   SIZE           REPORTING GROUP           |....|....|....|....|....|....|....|....|....|....|
                                                                             |                             |                   |
 62.21     0.87                     2612           ALL STUDENTS              *******************************                   |
                                                                             |                             |                   |
----ACTUALLY DOING LABORATORY EXPERIMENTS?  ----                             |                             |                   |
 63.47     0.93      1.26*   0.22   2007           ENJOY                     ********************************                  |
 58.19     1.02     -4.01*   0.69    544           O.K.                      ***************************** |                   |
 50.61     3.45    -11.60*   3.08     43           DON'T ENJOY               *************************     |                   |
                                                                             |                             |                   |
----WATCHING TEACHER DO EXPERIMENTS?        ----                             |                             |                   |
 60.95     1.30     -1.26*   0.63    804           ENJOY                     ******************************|                   |
 62.52     0.75      0.31    0.36   1389           O.K.                      *******************************                   |
 63.30     1.16      1.09    0.76    400           DON'T ENJOY               ********************************                  |
                                                                             |                             |                   |
----HOW HARD IS SCIENCE?                    ----                             |                             |                   |
 63.45     1.04      1.24    0.65    515           EASIER                    ********************************                  |
 62.59     0.96      0.38    0.24   1545           SAME                      *******************************                   |
 59.69     1.02     -2.51*   0.61    533           HARDER                    ******************************|                   |
                                                                             |                             |                   |
----LIKE TO LEARN ABOUT PAST SCIENTISTS?    ----                             |                             |                   |
 62.03     1.24     -0.18    0.48   1158           YES                       *******************************                   |
 62.26     0.70      0.05    0.39   1429           NO                        *******************************                   |
                                                                             |                             |                   |
----USE THE METRIC OR CUSTOMARY SYSTEM?     ----                             |                             |                   |
 64.04     1.08      1.83*   0.56    914           METRIC                    ********************************                  |
 58.80     1.50     -3.41*   1.27    295           CUSTOMARY                 ***************************** |                   |
 63.19     0.80      0.98*   0.43   1247           BOTH                      ********************************                  |
 47.71     1.98    -14.50*   1.74    134           NEITHER                   ************************      |                   |
                                                                             |                             |                   |
----SIZE OF COMMUNITY                       ----                             |                             |                   |
 48.75     1.71    -13.46*   1.66    395           BIG CITIES                ************************      |                   |
 64.53     0.98      2.33*   1.08    658           FRINGE CITIES             ********************************                  |
 63.73     1.00      1.53    1.10    632           MEDIUM CITIES             ********************************                  |
 65.56     0.78      3.35*   0.97    927           SMALLER PLACES            *********************************                 |
                                                                             |                             |                   |
----REGION                                  ----                             |                             |                   |
 64.90     1.66      2.69    1.73    298           RESCUE                    ********************************                  |
 61.26     1.89     -0.94    1.66    586           COOP ED SERV              *******************************                   |
 62.10     2.08     -0.11    1.59    660           CREC                      *******************************                   |
 60.08     1.75     -2.12    1.57    593           ACES                      ******************************|                   |
 64.80     1.26      2.59    1.41    303           PROJECT LEARN             ********************************                  |
 66.01     1.92      3.80    2.02    172           HARSES                    *********************************                 |
                                                                             |                             |                   |
----REGION NOT INCLUDING BIG CITIES         ----                             |                             |                   |
 64.90     1.66      2.69    1.73    298           RESCUE                    ********************************                  |
 65.51     1.07      3.30*   1.24    430           COOP ED SERV              *********************************                 |
 64.60     1.03      2.39*   1.11    570           CREC                      ********************************                  |
 63.58     1.38      1.37    1.41    444           ACES                      ********************************                  |
 64.80     1.26      2.59    1.41    303           PROJECT LEARN             ********************************                  |
 66.01     1.92      3.80    2.02    172           HARSES                    *********************************                 |
                    NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                  CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 8 - FALL 1979

                      KNOW THE FUNDAMENTAL FACTS AND PRINCIPALS OF SCIENCE
                                                                                          P-VALUE
         SE OF      GROUP    SE OF   SAMPLE                      0    10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE   EFFECT   EFFECT   SIZE       REPORTING GROUP   |....|....|....|....|....|....|....|....|....|....|
                                                                  |                             |                   |
 62.54    0.90                        2612       ALL STUDENTS     *******************************                   |
                                                                  |                             |                   |
----SEX OF THE STUDENT                      ----                  |                             |                   |
 66.38    0.94     3.85*    0.39    1206       MALE             *********************************                 |
 59.17    0.99    -3.37*    0.34    1388       FEMALE           ******************************|                   |
                                                                  |                             |                   |
----HOW DO YOU FEEL ABOUT SCIENCE?          ----                  |                             |                   |
 53.26    1.25    -9.27*    0.91     268       LEAST FAVORITE   ***************************   |                   |
 60.83    0.82    -1.71*    0.74     766       NOT MY FAVORITE  ******************************|                   |
 65.05    1.03     2.51*    0.36    1346       FAVORITE         *********************************                 |
 64.27    2.76     1.73     2.17     213       MOST FAVORITE    ********************************                  |
                                                                  |                             |                   |
----TIME SPENT ON ACTIVITIES?               ----                  |                             |                   |
 57.68    1.35    -4.86*    1.04     456       HARDLY EVER      ***************************** |                   |
 62.06    1.40    -0.48     0.99     440       MONTHLY          *******************************                   |
 64.43    0.92     1.89*    0.53    1071       WEEKLY           ********************************                  |
 62.92    1.32     0.38     0.87     626       DAILY            *******************************                   |
                                                                  |                             |                   |
----HOW VALUABLE IS THE STUDY OF SCIENCE?   ----                  |                             |                   |
 48.82    2.64   -13.72*    2.52      26       USELESS          ************************      |                   |
 50.74    1.59   -11.80*    1.16     229       NOT VALUABLE     *************************     |                   |
 59.83    1.00    -2.71*    0.36    1251       VALUABLE         ******************************|                   |
 68.45    0.83     5.91*    0.41    1087       VERY VALUABLE    **********************************                |
                                                                  |                             |                   |
----DO YOU HAVE A SCIENCE HOBBY?            ----                  |                             |                   |
 65.13    1.19     2.60*    0.61     653       YES              *********************************                 |
 61.60    0.89    -0.94*    0.20    1939       NO               *******************************                   |
                                                                  |                             |                   |
----ENJOY WATCHING SHOW - VISITING MUSEUM?  ----                  |                             |                   |
 68.60    1.42     6.06*    0.87     670       ENJOY            **********************************                |
 61.09    0.99    -1.45*    0.31    1627       O.K.             *******************************                   |
 56.53    1.24    -6.01*    1.12     293       DON'T ENJOY      ****************************  |                   |
                                                                  |                             |                   |
----LECTURES BY SCHOOL TEACHERS?            ----                  |                             |                   |
 60.43    4.08    -2.11     3.51     147       ENJOY            ******************************|                   |
 63.09    0.99     0.56     0.39    1202       O.K.             ********************************                  |
 62.17    0.80    -0.37     0.53    1244       DON'T ENJOY      *******************************                   |
                                                                  |                             |                   |
----CLASS DISCUSSION OF SCIENCE TOPICS?     ----                  |                             |                   |
 66.18    1.26     3.64*    0.61     771       ENJOY            *********************************                 |
 61.64    0.91    -0.90*    0.25    1608       O.K.             *******************************                   |
 55.90    1.27    -6.64*    1.23     212       DON'T ENJOY      ****************************  |                   |
                                                                  |                             |                   |
----READING ASSIGNED BOOKS ABOUT SCIENCE?   ----                  |                             |                   |
 60.69    2.38    -1.85     1.86     282       ENJOY            ******************************|                   |
 62.66    1.02     0.12     0.40    1261       O.K.             *******************************                   |
 62.79    0.82     0.25     0.59    1049       DON'T ENJOY      *******************************                   |
                         NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                       CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 8 - FALL 1979

                         KNOW THE FUNDAMENTAL FACTS AND PRINCIPALS OF SCIENCE
                                                                                         P-VALUE
            SE OF     GROUP      SE OF   SAMPLE                                  0    10   20   30   40   50   60   70   80   90   100
P-VALUE    P-VALUE    EFFECT    EFFECT    SIZE       REPORTING GROUP             |....|....|....|....|....|....|....|....|....|....|
                                                                                 |                              |                  |
  62.54     0.90                           2612      ALL STUDENTS                ********************************                  |
                                                                                 |                              |                  |
----ACTUALLY DOING LABORATORY EXPERIMENTS?        ----                           |                              |                  |
  63.92     0.95      1.33*      0.25      2007      ENJOY                       *********************************                 |
  58.25     1.14     -4.29*      0.78       544      O.K.                        ****************************** |                  |
  49.32     3.94    -13.22*      3.54        43      DON'T ENJOY                 **************************     |                  |
                                                                                 |                              |                  |
----WATCHING TEACHER DO EXPERIMENTS?              ----                           |                              |                  |
  61.35     1.37     -1.19       0.71       804      ENJOY                       ********************************                  |
  62.97     0.82      0.43       0.39      1389      O.K.                        ********************************                  |
  63.24     1.16      0.70       0.80       400      DON'T ENJOY                 *********************************                 |
                                                                                 |                              |                  |
----HOW HARD IS SCIENCE?                          ----                           |                              |                  |
  63.86     1.08      1.32       0.69       515      EASIER                      *********************************                 |
  62.97     1.01      0.43       0.29      1545      SAME                        ********************************                  |
  59.86     1.06     -2.68*      0.68       533      HARDER                      *******************************|                  |
                                                                                 |                              |                  |
----LIKE TO LEARN ABOUT PAST SCIENTISTS?          ----                           |                              |                  |
  63.22     1.27      0.69       0.50      1158      YES                         *********************************                 |
  61.91     0.75     -0.63       0.39      1429      NO                          ********************************                  |
                                                                                 |                              |                  |
----USE THE METRIC OR CUSTOMARY SYSTEM?           ----                           |                              |                  |
  63.63     1.07      1.09       0.60       914      METRIC                      *********************************                 |
  60.05     1.93     -2.49       1.60       295      CUSTOMARY                   *******************************|                  |
  63.77     0.87      1.23*      0.46      1247      BOTH                        *********************************                 |
  48.92     2.04    -13.62*      1.74       134      NEITHER                     *************************      |                  |
                                                                                 |                              |                  |
----SIZE OF COMMUNITY                             ----                           |                              |                  |
  49.64     1.71    -12.90*      1.68       395      BIG CITIES                  **************************     |                  |
  64.37     1.19      1.83       1.19       658      FRINGE CITIES               *********************************                 |
  64.75     1.21      2.22       1.21       632      MEDIUM CITIES               *********************************                 |
  65.50     0.89      2.96*      1.03       927      SMALLER PLACES              **********************************                |
                                                                                 |                              |                  |
----REGION                                        ----                           |                              |                  |
  65.27     1.91      2.73       1.94       298      RESCUE                      **********************************                |
  6[illegible].22     2.05     -1.32       1.78       586      COOP ED SERV                ********************************                  |
  61.70     2.02     -0.83       1.57       660      CREC                        ********************************                  |
  61.44     1.85     -1.10       1.64       593      ACES                        ********************************                  |
  65.52     1.48      2.99       1.58       303      PROJECT LEARN               **********************************                |
  66.71     1.78      4.17*      1.92       172      NARSES                      **********************************                |
                                                                                 |                              |                  |
----REGION NOT INCLUDING BIG CITIES               ----                           |                              |                  |
  65.27     1.91      2.73       1.94       298      RESCUE                      **********************************                |
  65.48     1.18      2.94*      1.29       430      COOP ED SERV                **********************************                |
  64.08     1.17      1.54       1.20       570      CREC                        *********************************                 |
  64.63     1.73      2.09       1.65       444      ACES                        *********************************                 |
  65.52     1.48      2.99       1.58       303      PROJECT LEARN               **********************************                |
  66.71     1.73      4.17*      1.92       172      NARSES                      **********************************                |
```

NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANAL Y REPORTING GROUPS
CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCI - GRADE 8 - FALL 1979

APPLY THE FUNDAMENTAL PRINCIPALS OF SCIENCE

```
                                                                                      P-VALUE
           SE OF     GROUP   SE OF  SAMPLE                                           0    10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE    EFFECT  EFFECT    SIZE          REPORTING GROUP                   I....I....I....I....I....I....I....I....I....I....I
                                                                                      I                           I                     I
  56.89     0.94                      2612          ALL STUDENTS                      ****************************                      I
                                                                                      I                           I                     I
----SEX OF THE STUDENT                     ----                                       I                           I                     I
  60.16     0.91     3.27*    0.37    1206          MALE                              ******************************                    I
  53.99     1.06    -2.90*    0.32    1388          FEMALE                            ***************************I                     I
                                                                                      I                           I                     I
----HOW DO YOU FEEL ABOUT SCIENCE?         ----                                       I                           I                     I
  46.98     1.59    -9.91*    1.08     268          LEAST FAVORITE                    ***********************     I                     I
  56.20     0.80    -0.69     0.80     766          NOT MY FAVORITE                   ****************************                      I
  59.02     1.05     2.13*    0.37    1346          FAVORITE                          ******************************                    I
  57.81     2.55     0.92     1.90     213          MOST FAVORITE                     *****************************                     I
                                                                                      I                           I                     I
----TIME SPENT ON ACTIVITIES?              ----                                       I                           I                     I
  50.63     1.26    -6.27*    0.98     456          HARDLY EVER                       *************************   I                     I
  56.33     1.40    -0.57     1.02     440          MONTHLY                           ****************************                      I
  58.76     0.87     1.87*    0.49    1071          WEEKLY                            *****************************                     I
  58.31     1.47     1.42     0.91     626          DAILY                             *****************************                     I
                                                                                      I                           I                     I
----HOW VALUABLE IS THE STUDY OF SCIENCE?  ----                                       I                           I                     I
  43.54     1.99   -13.35*    1.94      26          USELESS                           **********************      I                     I
  45.62     1.68   -11.28*    1.18     229          NOT VALUABLE                      ***********************     I                     I
  55.13     1.00    -1.77*    0.37    1251          VALUABLE                          ****************************                      I
  61.52     0.94     4.63*    0.41    1087          VERY VALUABLE                     *******************************                   I
                                                                                      I                           I                     I
----DO YOU HAVE A SCIENCE HOBBY?           ----                                       I                           I                     I
  59.00     1.38     2.10*    0.71     653          YES                               *****************************                     I
  56.08     0.88    -0.81*    0.24    1939          NO                                ****************************                      I
                                                                                      I                           I                     I
----ENJOY WATCHING SHOW - VISITING MUSEUM? ----                                       I                           I                     I
  61.83     1.56     4.94*    0.87     670          ENJOY                             *******************************                   I
  55.52     0.97    -1.38*    0.29    1627          O.K.                              ****************************                      I
  52.84     0.97    -4.05*    0.98     293          DON'T ENJOY                       **************************  I                     I
                                                                                      I                           I                     I
----LECTURES BY SCHOOL TEACHERS?           ----                                       I                           I                     I
  52.82     4.37    -4.08     3.69     147          ENJOY                             **************************  I                     I
  57.07     1.03     0.17     0.38    1202          O.K.                              *****************************                     I
  57.08     0.75     0.19     0.58    1244          DON'T ENJOY                       *****************************                     I
                                                                                      I                           I                     I
----CLASS DISCUSSION OF SCIENCE TOPICS?    ----                                       I                           I                     I
  59.51     1.30     2.62*    0.65     771          ENJOY                             ******************************                    I
  56.22     0.94    -0.67*    0.24    1608          O.K.                              ****************************                      I
  52.00     1.36    -4.89*    1.22     212          DON'T ENJOY                       **************************  I                     I
                                                                                      I                           I                     I
----READING ASSIGNED BOOKS ABOUT SCIENCE?  ----                                       I                           I                     I
  53.82     2.55    -3.07     1.91     282          ENJOY                             ***************************I                     I
  57.05     1.05     0.16     0.39    1261          O.K.                              *****************************                     I
  57.38     0.78     0.48     0.66    1049          DON'T ENJOY                       *****************************                     I
```

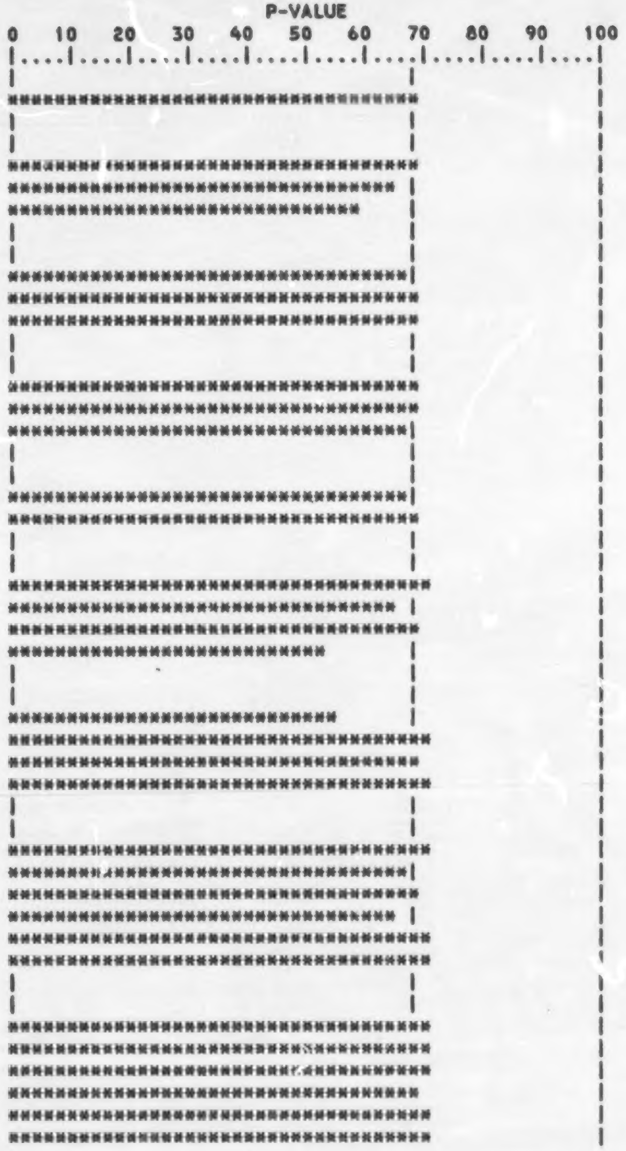
```
                          NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                        CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 8 - FALL 1979

                          APPLY THE FUNDAMENTAL PRINCIPALS OF SCIENCE
                                                                                                      P-VALUE
            SE OF      GROUP      SE OF    SAMPLE                                  0   10   20   30   40   50   60   70   80   90   100
P-VALUE   P-VALUE     EFFECT     EFFECT     SIZE         REPORTING GROUP           |....|....|....|....|....|....|....|....|....|....|
                                                                                   |                           |                     |
  56.89     0.94                           2612       ALL STUDENTS                 *****************************                     |
                                                                                   |                           |                     |
----ACTUALLY DOING LABORATORY EXPERIMENTS?           ----                          |                           |                     |
  58.26     1.03      1.37*      0.24      2007       ENJOY                        ******************************                    |
  52.42     1.04     -4.47*      0.77       544       O.K.                         *************************** |                     |
  45.41     3.59    -11.49*      3.22        43       DON'T ENJOY                  ************************    |                     |
                                                                                   |                           |                     |
----WATCHING TEACHER DO EXPERIMENTS?                 ----                          |                           |                     |
  55.64     1.40     -1.25       0.67       804       ENJOY                        *****************************                     |
  57.13     0.79      0.24       0.40      1389       O.K.                         ******************************                    |
  58.09     1.29      1.20       0.80       400       DON'T ENJOY                  ******************************                    |
                                                                                   |                           |                     |
----HOW HARD IS SCIENCE?                             ----                          |                           |                     |
  57.87     1.19      0.98       0.77       515       EASIER                       ******************************                    |
  57.41     0.98      0.52*      0.26      1545       SAME                         ******************************                    |
  54.13     1.24     -2.76*      0.74       533       HARDER                       ****************************|                     |
                                                                                   |                           |                     |
----LIKE TO LEARN ABOUT PAST SCIENTISTS?             ----                          |                           |                     |
  56.58     1.35     -0.31       0.55      1158       YES                          *****************************                     |
  57.00     0.75      0.11       0.45      1429       NO                           ******************************                    |
                                                                                   |                           |                     |
----USE THE METRIC OR CUSTOMARY SYSTEM?              ----                          |                           |                     |
  59.20     1.16      2.31*      0.62       914       METRIC                       *******************************                   |
  52.88     1.52     -4.01*      1.28       295       CUSTOMARY                    *************************** |                     |
  57.66     0.88      0.77       0.47      1247       BOTH                         ******************************                    |
  42.22     2.33    -14.68*      2.06       134       NEITHER                      **********************      |                     |
                                                                                   |                           |                     |
----SIZE OF COMMUNITY                                ----                          |                           |                     |
  42.18     1.87    -14.71*      1.78       395       BIG CITIES                   **********************      |                     |
  59.31     1.02      2.42*      1.17       658       FRINGE CITIES                *******************************                   |
  58.53     1.03      1.64       1.17       632       MEDIUM CITIES                ******************************                    |
  60.67     0.77      3.77*      1.03       927       SMALLER PLACES               *******************************                   |
                                                                                   |                           |                     |
----REGION                                           ----                          |                           |                     |
  60.37     1.80      3.48       1.87       298       RESCUE                       *******************************                   |
  56.13     2.02     -0.77       1.77       586       COOP ED SERV                 *****************************                     |
  56.69     2.26     -0.20       1.72       660       CREC                         *****************************                     |
  54.15     1.88     -2.75       1.69       593       ACES                         ****************************|                     |
  59.73     1.12      2.84*      1.36       303       PROJECT LEARN                *******************************                   |
  61.15     1.84      4.25*      1.98       172       NARSES                       ********************************                  |
                                                                                   |                           |                     |
----REGION NOT INCLUDING BIG CITIES                  ----                          |                           |                     |
  60.37     1.80      3.48       1.87       298       RESCUE                       *******************************                   |
  60.58     1.29      3.69*      1.43       430       COOP ED SERV                 *******************************                   |
  59.40     1.04      2.51*      1.17       570       CREC                         *******************************                   |
  58.11     1.34      1.22       1.42       444       ACES                         ******************************                    |
  59.73     1.12      2.84*      1.36       303       PROJECT LEARN                *******************************                   |
  61.15     1.84      4.25*      1.98       172       NARSES                       ********************************                  |
                    NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALY    BY REPORTING GROUPS
                   CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCI[illegible] - GRADE 8 - FALL 1979

                     UNDERSTAND AND APPLY THE PROCESSES OF SCIENCE

          SE OF    GROUP     SE OF  SAMPLE
P-VALUE  P-VALUE  EFFECT    EFFECT   SIZE             REPORTING GROUP

 67.38    0.87                       2612             ALL STUDENTS

----SEX OF THE STUDENT                           ----
 68.88    0.90     1.50*     0.34    1206             MALE
 66.03    0.95    -1.35*     0.30    1388             FEMALE

----HOW DO YOU FEEL ABOUT SCIENCE?               ----
 59.41    1.36    -7.97*     1.09     268             LEAST FAVORITE
 67.63    0.84     0.25      0.75     766             NOT MY FAVORITE
 68.99    1.04     1.61*     0.39    1346             FAVORITE
 66.09    2.06    -1.30      1.58     213             MOST FAVORITE

----TIME SPENT ON ACTIVITIES?                    ----
 60.72    0.98    -6.67*     0.93     456             HARDLY EVER
 66.37    1.24    -1.02      0.90     440             MONTHLY
 69.45    0.85     2.07*     0.43    1071             WEEKLY
 69.13    1.35     1.75*     0.85     626             DAILY

----HOW VALUABLE IS THE STUDY OF SCIENCE?        ----
 57.20    2.23   -10.19*     2.17      26             USELESS
 57.15    1.61   -10.24*     1.19     229             NOT VALUABLE
 65.83    0.98    -1.55*     0.33    1251             VALUABLE
 71.53    0.79     4.14*     0.38    1087             VERY VALUABLE

----DO YOU HAVE A SCIENCE HOBBY?                 ----
 68.27    1.12     0.88      0.58     653             YES
 67.01    0.87    -0.37      0.19    1939             NO

----ENJOY WATCHING SHOW - VISITING MUSEUM?       ----
 70.79    1.36     3.40*     0.72     670             ENJOY
 66.35    0.90    -1.03*     0.26    1627             O.K.
 64.97    0.97    -2.41*     0.95     293             DON'T ENJOY

----LECTURES BY SCHOOL TEACHERS?                 ----
 61.93    4.30    -5.45      3.74     147             ENJOY
 67.33    0.88    -0.05      0.36    1202             O.K.
 67.98    0.76     0.59      0.54    1244             DON'T ENJOY

----CLASS DISCUSSION OF SCIENCE TOPICS?          ----
 69.60    1.16     2.21*     0.61     771             ENJOY
 66.62    0.91    -0.76*     0.26    1608             O.K.
 64.86    1.30    -2.52*     1.19     212             DON'T ENJOY

----READING ASSIGNED BOOKS ABOUT SCIENCE?        ----
 63.[illegible]7    2.26    -3.91*     1.72     282             ENJOY
 67.47    0.94     0.08      0.38    1261             O.K.
 68.22    0.79     0.64      0.60    1049             DON'T ENJOY
```



NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 8 - FALL 1979

UNDERSTAND AND APPLY THE PROCESSES OF SCIENCE

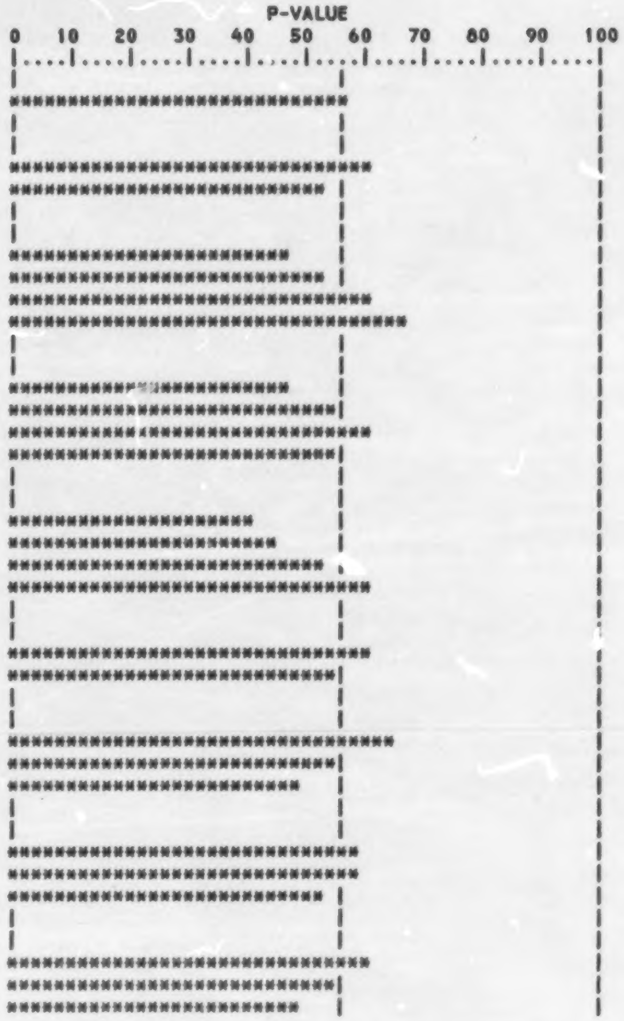
P-VALUE	SE OF P-VALUE	GROUP EFFECT	SE OF EFFECT	SAMPLE SIZE	REPORTING GROUP
67.38	0.87			2612	ALL STUDENTS
----ACTUALLY DOING LABORATORY EXPERIMENTS? ----					
68.42	0.91	1.04*	0.21	2007	ENJOY
64.09	1.08	-3.30*	0.72	544	O.K.
57.45	3.41	-9.94*	3.12	43	DON'T ENJOY
----WATCHING TEACHER DO EXPERIMENTS? ----					
65.99	1.24	-1.40*	0.64	804	ENJOY
67.71	0.80	0.33	0.36	1389	O.K.
68.67	1.26	1.29	0.88	400	DON'T ENJOY
----HOW HARD IS SCIENCE? ----					
68.74	1.07	1.35	0.70	515	EASIER
67.58	0.98	0.19	0.27	1545	SAME
65.32	1.00	-2.06*	0.67	533	HARDER
----LIKE TO LEARN ABOUT PAST SCIENTISTS? ----					
66.39	1.19	-0.99*	0.49	1158	YES
68.10	0.74	0.71	0.41	1429	NO
----USE THE METRIC OR CUSTOMARY SYSTEM? ----					
69.50	1.16	2.11*	0.63	914	METRIC
63.59	1.40	-3.79*	1.25	295	CUSTOMARY
68.34	0.78	0.95*	0.47	1247	BOTH
52.08	1.92	-15.31*	1.76	134	NEITHER
----SIZE OF COMMUNITY ----					
54.58	1.73	-12.80*	1.70	395	BIG CITIES
70.16	1.01	2.78*	1.09	658	FRINGE CITIES
68.03	1.06	0.65	1.13	632	MEDIUM CITIES
70.73	0.96	3.35*	1.02	927	SMALLER PLACES
----REGION ----					
69.32	1.62	1.94	1.69	298	RESCUE
66.66	1.89	-0.72	1.65	586	COOP ED SERV
68.13	2.10	0.74	1.61	660	CREC
64.81	1.68	-2.58	1.52	593	ACES
69.28	1.52	1.90	1.60	303	PROJECT LEARN
70.22	2.32	2.83	2.38	172	NARSES
----REGION NOT INCLUDING BIG CITIES ----					
69.32	1.62	1.94	1.69	298	RESCUE
70.72	1.47	3.34*	1.51	430	COOP ED SERV
70.52	1.23	3.14*	1.19	570	CREC
68.16	1.24	0.77	1.33	444	ACES
69.28	1.52	1.90	1.60	303	PROJECT LEARN
70.22	2.32	2.83	2.38	172	NARSES



NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

TOTAL SCORE FOR SCIENCE

P-VALUE	SE OF P-VALUE	GROUP EFFECT	SE OF EFFECT	SAMPLE SIZE	REPORTING GROUP
55.19	0.67			2301	ALL STUDENTS
----SEX OF THE STUDENT ----					
59.59	0.84	4.40*	0.40	1094	MALE
51.24	0.67	-3.95*	0.35	1204	FEMALE
----HOW DO YOU FEEL ABOUT SCIENCE? ----					
45.23	0.88	-9.96*	0.70	313	LEAST FAVORITE
51.82	0.64	-3.37*	0.43	955	NOT MY FAVORITE
60.61	0.88	5.41*	0.47	902	FAVORITE
66.76	1.65	11.57*	1.34	125	MOST FAVORITE
----TIME SPENT ON ACTIVITIES? ----					
46.43	1.03	-8.76*	0.87	405	HARDLY EVER
53.60	0.94	-1.59*	0.73	392	MONTHLY
59.36	0.67	4.16*	0.37	1196	WEEKLY
53.61	1.38	-1.58	1.13	285	DAILY
----HOW VALUABLE IS THE STUDY OF SCIENCE? ----					
40.99	2.87	-14.20*	2.91	34	USELESS
43.70	1.84	-11.50*	1.48	125	NOT VALUABLE
51.95	0.61	-3.24*	0.44	910	VALUABLE
59.23	0.80	4.04*	0.38	1228	VERY VALUABLE
----DO YOU HAVE A SCIENCE HOBBY? ----					
59.35	1.24	4.16*	0.92	541	YES
53.95	0.65	-1.24*	0.24	1752	NO
----ENJOY WATCHING SHOW - VISITING MUSEUM? ----					
63.39	1.21	8.20*	0.86	507	ENJOY
54.28	0.70	-0.91*	0.25	1388	O.K.
48.10	0.78	-7.09*	0.68	401	DON'T ENJOY
----LECTURES BY SCHOOL TEACHERS? ----					
57.02	2.64	1.83	2.26	122	ENJOY
58.04	0.95	2.85*	0.47	1019	O.K.
52.58	0.51	-2.61*	0.40	1150	DON'T ENJOY
----CLASS DISCUSSION OF SCIENCE TOPICS? ----					
60.31	1.28	5.12*	0.81	597	ENJOY
54.69	0.61	-0.50	0.30	1385	O.K.
47.97	0.88	-7.22*	0.83	308	DON'T ENJOY

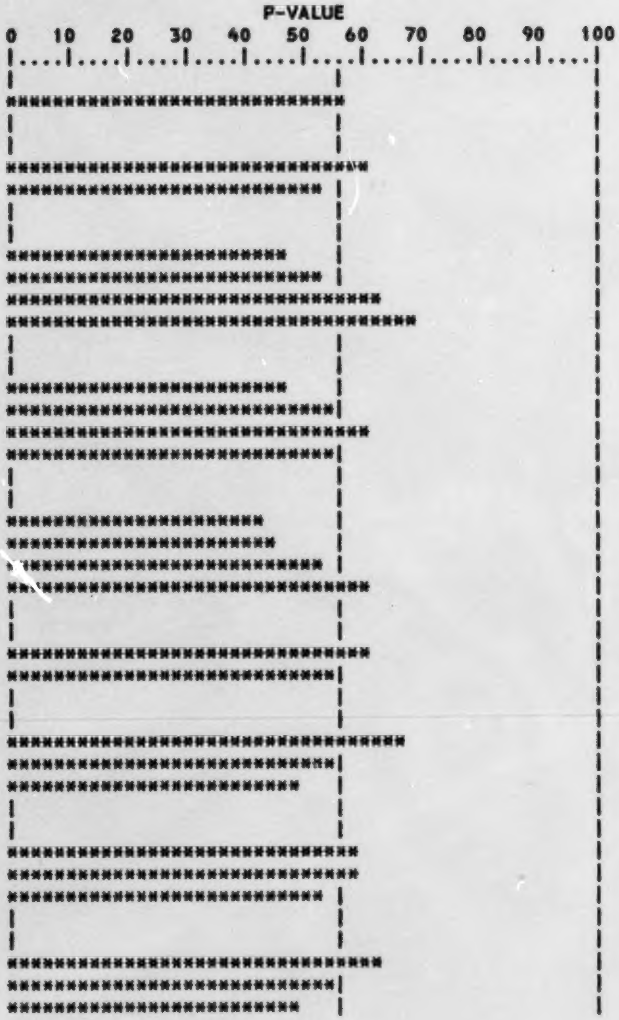


```
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                    CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

                        TOTAL SCORE FOR SCIENCE
                                                                                                   P-VALUE
          SE OF    GROUP    SE OF  SAMPLE                                    0   10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE  EFFECT   EFFECT   SIZE           REPORTING GROUP           |....|....|....|....|....|....|....|....|....|....|
                                                                             |                           |                     |
 55.19     0.67                      2301          ALL STUDENTS              *****************************                     |
                                                                             |                           |                     |
----READING ASSIGNED BOOKS ABOUT SCIENCE?   ----                             |                           |                     |
 59.96     3.11      4.77      2.69    96          ENJOY                     *******************************                   |
 55.65     1.16      0.46      0.74   790          O.K.                      *****************************                     |
 54.75     0.57     -0.44      0.43  1403          DON'T ENJOY               ****************************|                     |
                                                                             |                           |                     |
----ACTUALLY DOING LABORATORY EXPERIMENTS?  ----                             |                           |                     |
 57.47     0.77      2.28*     0.34  1305          ENJOY                     ******************************                    |
 53.18     0.73     -2.02*     0.41   836          O.K.                      ****************************|                     |
 48.31     1.50     -6.88*     1.39   149          DON'T ENJOY               *************************   |                     |
                                                                             |                           |                     |
----WATCHING TEACHER DO EXPERIMENTS?        ----                             |                           |                     |
 56.01     1.10      0.81      0.65   806          ENJOY                     *****************************                     |
 55.31     0.63      0.11      0.34  1238          O.K.                      *****************************                     |
 52.89     1.08     -2.30*     0.97   245          DON'T ENJOY               *************************** |                     |
                                                                             |                           |                     |
----HOW VALUABLE WILL SCIENCE COURSES BE?   ----                             |                           |                     |
 45.36     1.00     -9.83*     1.00   167          USELESS                   ************************    |                     |
 50.18     0.65     -5.02*     0.42   334          NOT VALUABLE              **************************  |                     |
 57.71     0.77      2.52*     0.43   886          VALUABLE                  ******************************                    |
 64.18     1.37      8.99*     0.98   406          VERY VALUABLE             *********************************                 |
                                                                             |                           |                     |
----LAST TIME YOU TOOK A SCIENCE COURSE?    ----                             |                           |                     |
 40.43     1.23    -14.77*     1.15   155          TWO YEARS AGO             *********************       |                     |
 48.33     0.66     -6.86*     0.49   800          LAST YEAR                 *************************   |                     |
 60.97     0.63      5.78*     0.34  1344          NOW                       *******************************                   |
                                                                             |                           |                     |
----TOOK GENERAL SCIENCE?                   ----                             |                           |                     |
 53.56     0.83     -1.63*     0.49  1091          YES                       ****************************|                     |
 57.32     0.77      2.13*     0.44  1030          NO                        ******************************                    |
 50.44     1.73     -4.75*     1.63    99          DON'T KNOW                **************************  |                     |
                                                                             |                           |                     |
----TOOK EARTH SCIENCE?                     ----                             |                           |                     |
 55.18     0.67     -0.01      0.52  1157          YES                       *****************************                     |
 55.39     0.91      0.19      0.51   987          NO                        *****************************                     |
 52.66     2.44     -2.53      2.08    77          DON'T KNOW                *************************** |                     |
                                                                             |                           |                     |
----TOOK BIOLOGY?                           ----                             |                           |                     |
 56.34     0.66      1.15*     0.21  2026          YES                       *****************************                     |
 47.01     1.51     -8.18*     1.45   241          NO                        *************************   |                     |
 46.72     4.0      -8.47*     3.84    17          DON'T KNOW                ************************    |                     |
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                    CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

                        TOTAL SCORE FOR SCIENCE
                                                                                                    P-VALUE
          SE OF    GROUP    SE OF  SAMPLE                                     0   10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE  EFFECT   EFFECT   SIZE           REPORTING GROUP            |....|....|....|....|....|....|....|....|....|....|
                                                                              |                           |                     |
 55.19     0.67                      2301          ALL STUDENTS               *****************************                     |
                                                                              |                           |                     |
----TOOK CHEMISTRY?                         ----                              |                           |                     |
 62.94     0.63     7.75*    0.48   1133          YES                        ********************************                  |
 47.65     0.72    -7.54*    0.50   1060          NO                         *************************   |                     |
 45.71     3.09    -9.48*    2.96     21          DON'T KNOW                 ************************    |                     |
                                                                              |                           |                     |
----TOOK PHYSICS?                           ----                              |                           |                     |
 59.97     1.60     4.78*    1.29    384          YES                        *******************************                   |
 54.11     0.63    -1.08*    0.27   1718          NO                         ****************************|                     |
 52.49     2.75    -2.70     2.37     33          DON'T KNOW                 *************************** |                     |
                                                                              |                           |                     |
----TOOK SECOND-YEAR BIOLOGY?               ----                              |                           |                     |
 56.08     1.84     0.88     1.55    198          YES                        *****************************                     |
 55.04     0.65    -0.15     0.18   1896          NO                         *****************************                     |
 54.62     2.87    -0.57     2.88     39          DON'T KNOW                 ****************************|                     |
                                                                              |                           |                     |
----TOOK SECOND-YEAR CHEMISTRY?             ----                              |                           |                     |
 68.04     3.28    12.85*    3.10     47          YES                        ***********************************               |
 54.83     0.67    -0.36*    0.14   2049          NO                         ****************************|                     |
 56.24     2.93     1.05     2.88     31          DON'T KNOW                 *****************************                     |
                                                                              |                           |                     |
----TOOK SECOND-YEAR PHYSICS?               ----                              |                           |                     |
 51.28     1.89    -3.92*    1.75     31          YES                        *************************** |                     |
 55.14     0.67    -0.05     0.13   2057          NO                         *****************************                     |
 54.78     2.77    -0.41     2.70     35          DON'T KNOW                 ****************************|                     |
                                                                              |                           |                     |
----DOES SCHOOL OFFER VARIETY OF COURSES?   ----                              |                           |                     |
 55.29     0.69     0.10     0.20   1838          YES                        *****************************                     |
 55.16     1.02    -0.03     0.82    451          NO                         *****************************                     |
                                                                              |                           |                     |
----SCIENTISTS LET PEOPLE TEST BELIEFS?     ----                              |                           |                     |
 56.68     0.69     1.49*    0.20   1752          AGREE                      *****************************                     |
 50.44     1.32    -4.76*    1.07    184          DISAGREE                   **************************  |                     |
 50.61     0.86    -4.58*    0.74    362          UNDECIDED                  **************************  |                     |
                                                                              |                           |                     |
----SCIENCE HELPS CONTROL NATURE?           ----                              |                           |                     |
 54.21     0.82    -0.99*    0.29   1180          AGREE                      ****************************|                     |
 57.95     0.65     2.76*    0.46    735          DISAGREE                   ******************************                    |
 53.23     0.91    -1.96*    0.76    381          UNDECIDED                  ****************************|                     |
          NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
       CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

               TOTAL SCORE FOR SCIENCE
                                                                                    P-VALUE
         SE OF    GROUP    SE OF  SAMPLE                      0    10   20   30   40   50   60   70   80   90   100
P-VALUE P-VALUE  EFFECT   EFFECT   SIZE      REPORTING GROUP  |....|....|....|....|....|....|....|....|....|....|
                                                              |                          |                      |
 55.19    0.67                     2301     ALL STUDENTS      ****************************                      |
                                                              |                          |                      |
----SCIENCE DOES NOT TELL RIGHT-WRONG?       ----             |                          |                      |
 57.60    0.67     2.41*    0.26   1432     AGREE             *****************************                     |
 50.89    1.01    -4.31*    0.67    395     DISAGREE          *************************  |                      |
 51.69    0.82    -3.50*    0.63    472     UNDECIDED         ************************** |                      |
                                                              |                          |                      |
----SCIENCE HAS ANSWERS TO PROBLEMS?         ----             |                          |                      |
 52.03    1.05    -3.16*    0.58    535     AGREE             ************************** |                      |
 57.60    0.64     2.40*    0.39   1272     DISAGREE          *****************************                     |
 52.49    0.88    -2.70*    0.69    492     UNDECIDED         ************************** |                      |
                                                              |                          |                      |
----SCIENCE CAN SOLVE HUMAN PROBLEMS?        ----             |                          |                      |
 56.32    1.06     1.13*    0.54    756     AGREE             ****************************                      |
 54.84    0.66    -0.35     0.39    850     DISAGREE          ***************************|                      |
 54.53    0.67    -0.66     0.47    693     UNDECIDED         ***************************|                      |
                                                              |                          |                      |
----SIZE OF COMMUNITY                        ----             |                          |                      |
 46.45    2.82    -8.74*    2.56    304     BIG CITIES        ***********************    |                      |
 56.36    0.85     1.16     0.94    592     FRINGE CITIES     ****************************                      |
 55.82    0.71     0.62     0.82    647     MEDIUM CITIES     ****************************                      |
 57.53    0.79     2.34*    0.82    758     SMALLER PLACES    *****************************                     |
                                                              |                          |                      |
----REGION                                   ----             |                          |                      |
 56.89    1.25     1.69     1.29    238     RESCUE            ****************************                      |
 56.08    1.47     0.89     1.26    490     COOP ED SERV      ****************************                      |
 56.05    1.20     0.86     1.00    685     CREC              ****************************                      |
 51.05    1.58    -4.15*    1.36    510     ACES              ************************** |                      |
 56.72    1.23     1.52     1.27    250     PROJECT LEARN     ****************************                      |
 56.70    2.74     1.51     2.70    128     MARSES            ****************************                      |
                                                              |                          |                      |
----REGION NOT INCLUDING BIG CITIES          ----             |                          |                      |
 56.89    1.25     1.69     1.29    238     RESCUE            ****************************                      |
 57.55    0.93     2.36*    1.00    366     COOP ED SERV      *****************************                     |
 57.47    0.84     2.28*    0.88    618     CREC              *****************************                     |
 53.82    0.56    -1.37     0.80    397     ACES              ***************************|                      |
 56.72    1.23     1.52     1.27    250     PROJECT LEARN     ****************************                      |
 56.70    2.74     1.51     2.70    128     MARSES            ****************************                      |
```

NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

KNOW THE FUNDAMENTAL FACTS AND PRINCIPALS OF SCIENCE

P-VALUE	SE OF P-VALUE	GROUP EFFECT	SE OF EFFECT	SAMPLE SIZE	REPORTING GROUP
55.51	0.70			2301	ALL STUDENTS
----SEX OF THE STUDENT ----					
60.18	0.92	4.67*	0.46	1094	MALE
51.32	0.71	-4.19*	0.41	1204	FEMALE
----HOW DO YOU FEEL ABOUT SCIENCE? ----					
45.09	0.88	-10.42*	0.71	313	LEAST FAVORITE
51.71	0.67	-3.81*	0.49	955	NOT MY FAVORITE
61.33	0.96	5.81*	0.53	902	FAVORITE
68.66	1.86	13.14*	1.48	125	MOST FAVORITE
----TIME SPENT ON ACTIVITIES? ----					
45.98	1.11	-9.53*	0.93	405	HARDLY EVER
54.79	0.99	-0.72	0.82	392	MONTHLY
59.74	0.73	4.23*	0.42	1196	WEEKLY
53.61	1.52	-1.91	1.25	285	DAILY
----HOW VALUABLE IS THE STUDY OF SCIENCE? ----					
42.97	3.66	-12.54*	3.62	34	USELESS
43.62	1.81	-11.90*	1.52	125	NOT VALUABLE
51.89	0.67	-3.62*	0.50	910	VALUABLE
59.85	0.88	4.33*	0.44	1228	VERY VALUABLE
----DO YOU HAVE A SCIENCE HOBBY? ----					
60.27	1.43	4.75*	1.06	541	YES
54.10	0.67	-1.41*	0.28	1752	NO
----ENJOY WATCHING SHOW - VISITING MUSEUM? ----					
65.17	1.35	9.66*	0.96	507	ENJOY
54.29	0.71	-1.22*	0.28	1388	O.K.
47.63	0.91	-7.88*	0.78	401	DON'T ENJOY
----LECTURES BY SCHOOL TEACHERS? ----					
57.26	2.85	1.74	2.45	122	ENJOY
58.77	0.98	3.26*	0.48	1019	O.K.
52.55	0.55	-2.96*	0.41	1150	DON'T ENJOY
----CLASS DISCUSSION OF SCIENCE TOPICS? ----					
[illegible]1.12	1.35	5.61*	0.89	597	ENJOY
[illegible].89	0.69	-0.62	0.34	1385	O.K.
47.87	0.95	-7.64*	0.94	308	DON'T ENJOY



```
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                    CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

                        KNOW THE FUNDAMENTAL FACTS AND PRINCIPALS OF SCIENCE
                                                                                                   P-VALUE
         SE OF    GROUP    SE OF   SAMPLE                                    0   10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE  EFFECT   EFFECT    SIZE          REPORTING GROUP           |....|....|....|....|....|....|....|....|....|....|
                                                                             |                           |                     |
 55.51     0.70                       2301           ALL STUDENTS              *****************************                     |
                                                                             |                           |                     |
----READING ASSIGNED BOOKS ABOUT SCIENCE?   ----                             |                           |                     |
 62.27     3.28     6.75*    2.87     96           ENJOY                     ********************************                  |
 55.70     1.25     0.18     0.78    790           O.K.                      *****************************                     |
 55.09     0.60    -0.42     0.47   1403           DON'T ENJOY               *****************************                     |
                                                                             |                           |                     |
----ACTUALLY DOING LABORATORY EXPERIMENTS?  ----                             |                           |                     |
 57.76     0.86     2.25*    0.39   1305           ENJOY                     ******************************                    |
 53.62     0.77    -1.89*    0.48    836           O.K.                      ****************************|                     |
 48.32     1.64    -7.19*    1.54    149           DON'T ENJOY               *************************   |                     |
                                                                             |                           |                     |
----WATCHING TEACHER DO EXPERIMENTS?        ----                             |                           |                     |
 56.49     1.14     0.98     0.69    806           ENJOY                     *****************************                     |
 55.49     0.68    -0.02     0.39   1238           O.K.                      *****************************                     |
 53.38     1.24    -2.13*    1.07    245           DON'T ENJOY               ****************************|                     |
                                                                             |                           |                     |
----HOW VALUABLE WILL SCIENCE COURSES BE?   ----                             |                           |                     |
 44.95     1.23   -10.56*    1.23    167           USELESS                   ***********************     |                     |
 50.24     0.70    -5.28*    0.50    834           NOT VALUABLE              **************************  |                     |
 58.09     0.82     2.58*    0.44    886           VALUABLE                  ******************************                    |
 65.12     1.49     9.61*    1.07    406           VERY VALUABLE             **********************************                |
                                                                             |                           |                     |
----LAST TIME YOU TOOK A SCIENCE COURSE?    ----                             |                           |                     |
 39.71     1.37   -15.81*    1.27    155           TWO YEARS AGO             *********************       |                     |
 48.53     0.76    -6.99*    0.57    800           LAST YEAR                 *************************   |                     |
 61.48     0.70     5.96*    0.40   1344           NOW                       ********************************                  |
                                                                             |                           |                     |
----TOOK GENERAL SCIENCE?                   ----                             |                           |                     |
 53.75     0.84    -1.76*    0.51   1091           YES                       ****************************|                     |
 57.73     0.83     2.21*    0.45   1030           NO                        ******************************                    |
 51.07     1.93    -4.44*    1.82     99           DON'T KNOW                *************************** |                     |
                                                                             |                           |                     |
----TOOK EARTH SCIENCE?                     ----                             |                           |                     |
 55.46     0.71    -0.05     0.53   1157           YES                       *****************************                     |
 55.65     0.99     0.14     0.57    987           NO                        *****************************                     |
 52.98     2.58    -2.53     2.25     77           DON'T KNOW                *************************** |                     |
                                                                             |                           |                     |
----TOOK BIOLOGY?                           ----                             |                           |                     |
 56.81     0.69     1.29*    0.22   2026           YES                       *****************************                     |
 46.25     1.50    -9.26*    1.45    241           NO                        ************************    |                     |
 44.59     3.36   -10.92*    3.27     17           DON'T KNOW                ***********************     |                     |
```

245

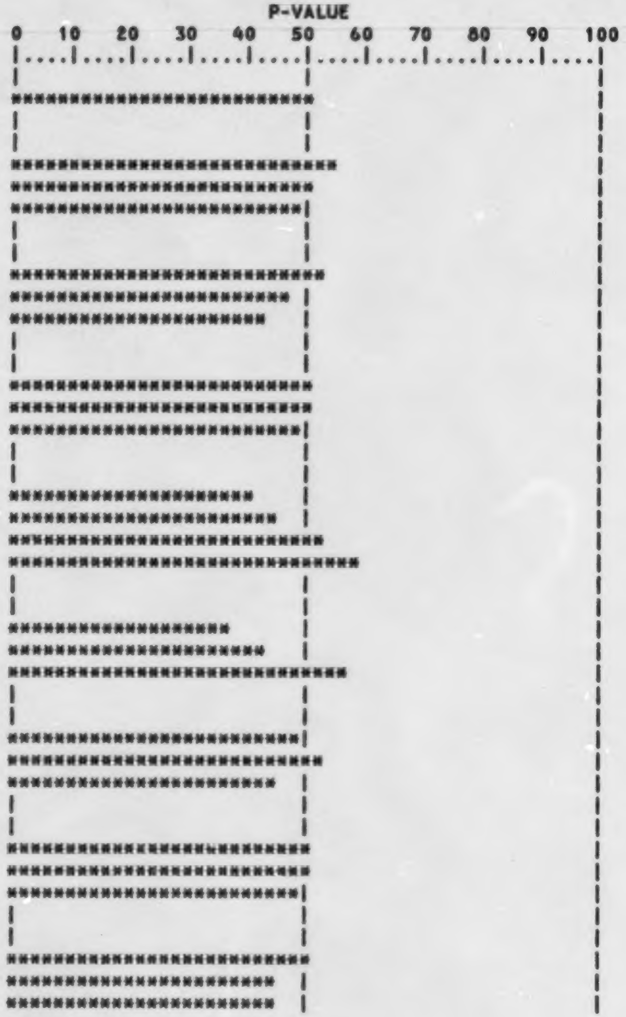
246

```
                NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
             CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

                 KNOW THE FUNDAMENTAL FACTS AND PRINCIPALS OF SCIENCE
                                                                                            P-VALUE
           SE OF     GROUP    SE OF  SAMPLE                        0    10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE    EFFECT   EFFECT    SIZE       REPORTING GROUP  |....|....|....|....|....|....|....|....|....|....|
                                                                   |                           |                     |
  55.51     0.70                      2301       ALL STUDENTS     ****************************                      |
                                                                   |                           |                     |
----TOOK CHEMISTRY?                       ----                     |                           |                     |
  63.33     0.69     7.82*    0.51   1133       YES              ********************************                  |
  47.85     0.81    -7.66*    0.56   1060       NO               ************************    |                     |
  45.22     3.61   -10.29*    3.44     21       DON'T KNOW       ***********************     |                     |
                                                                   |                           |                     |
----TOOK PHYSICS?                         ----                     |                           |                     |
  60.10     1.71     4.59*    1.38    384       YES              ******************************                    |
  54.47     0.67    -1.04*    0.29   1718       NO               ***************************|                     |
  52.00     2.90    -3.52     2.49     33       DON'T KNOW       **************************  |                     |
                                                                   |                           |                     |
----TOOK SECOND-YEAR BIOLOGY?             ----                     |                           |                     |
  57.09     2.10     1.58     1.81    198       YES              *****************************                     |
  55.28     0.69    -0.24     0.20   1896       NO               ****************************                      |
  55.21     2.84    -0.30     2.88     39       DON'T KNOW       ****************************                      |
                                                                   |                           |                     |
----TOOK SECOND-YEAR CHEMISTRY?           ----                     |                           |                     |
  68.11     3.78    12.60*    3.60     47       YES              **********************************                |
  55.13     0.71    -0.39*    0.15   2049       NO               ****************************                      |
  58.15     2.81     2.63     2.81     31       DON'T KNOW       *****************************                     |
                                                                   |                           |                     |
----TOOK SECOND-YEAR PHYSICS?             ----                     |                           |                     |
  51.09     2.18    -4.43*    2.06     31       YES              **************************  |                     |
  55.42     0.71    -0.09     0.14   2057       NO               ****************************                      |
  56.63     2.63     1.12     2.55     35       DON'T KNOW       ****************************                      |
                                                                   |                           |                     |
----DOES SCHOOL OFFER VARIETY OF COURSES? ----                     |                           |                     |
  55.57     0.71     0.06     0.20   1838       YES              ****************************                      |
  55.63     1.07     0.12     0.81    451       NO               ****************************                      |
                                                                   |                           |                     |
----SCIENTISTS LET PEOPLE TEST BELIEFS?   ----                     |                           |                     |
  57.11     0.74     1.59*    0.22   1752       AGREE            *****************************                     |
  50.07     1.35    -5.44*    1.19    184       DISAGREE         *************************   |                     |
  50.78     0.94    -4.73*    0.78    362       UNDECIDED        *************************   |                     |
                                                                   |                           |                     |
----SCIENCE HELPS CONTROL NATURE?         ----                     |                           |                     |
  54.40     0.83    -1.11*    0.30   1180       AGREE            ***************************|                     |
  58.75     0.70     3.23*    0.45    735       DISAGREE         *****************************                     |
  52.92     1.00    -2.59*    0.82    381       UNDECIDED        **************************  |                     |
                    NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                  CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

                      KNOW THE FUNDAMENTAL FACTS AND PRINCIPALS OF SCIENCE
                                                                                                 P-VALUE
           SE OF    GROUP      SE OF SAMPLE                                 0    10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE   EFFECT     EFFECT   SIZE             REPORTING GROUP     |....|....|....|....|....|....|....|....|....|....|
                                                                            |                          |                      |
 55.51      0.70                       2301             ALL STUDENTS        ****************************                      |
                                                                            |                          |                      |
----SCIENCE DOES NOT TELL RIGHT-WRONG?          ----                        |                          |                      |
 58.09      0.72     2.58*      0.29   1432             AGREE               *****************************                     |
 50.53      1.11    -4.98*      0.81    395             DISAGREE            *************************  |                      |
 52.07      0.87    -3.44*      0.68    472             UNDECIDED           ************************** |                      |
                                                                            |                          |                      |
----SCIENCE HAS ANSWERS TO PROBLEMS?            ----                        |                          |                      |
 52.15      1.04    -3.36*      0.59    535             AGREE               ************************** |                      |
 58.30      0.69     2.79*      0.39   1272             DISAGREE            *****************************                     |
 51.99      0.92    -3.52*      0.72    492             UNDECIDED           ************************** |                      |
                                                                            |                          |                      |
----SCIENCE CAN SOLVE HUMAN PROBLEMS?           ----                        |                          |                      |
 56.89      1.14     1.37*      0.61    756             AGREE               ****************************                      |
 54.97      0.73    -0.55       0.43    850             DISAGREE            ***************************|                      |
 54.79      0.68    -0.72       0.54    693             UNDECIDED           ***************************|                      |
                                                                            |                          |                      |
----SIZE OF COMMUNITY                           ----                        |                          |                      |
 46.63      2.71    -8.89*      2.47    304             BIG CITIES          ***********************    |                      |
 57.12      0.87     1.61       0.96    592             FRINGE CITIES       *****************************                     |
 56.03      0.72     0.51       0.83    647             MEDIUM CITIES       ****************************                      |
 57.68      0.87     2.16*      0.86    758             SMALLER PLACES      *****************************                     |
                                                                            |                          |                      |
----REGION                                      ----                        |                          |                      |
 56.79      1.43     1.28       1.45    238             RESCUE              ****************************                      |
 56.44      1.30     0.92       1.18    490             COOP ED SERV        ****************************                      |
 56.29      1.28     0.78       1.05    685             CREC                ****************************                      |
 51.90      1.81    -3.62*      1.53    510             ACES                ************************** |                      |
 56.56      1.58     1.05       1.55    250             PROJECT LEARN       ****************************                      |
 57.09      2.53     1.58       2.52    128             NARSES              *****************************                     |
                                                                            |                          |                      |
----REGION NOT INCLUDING BIG CITIES             ----                        |                          |                      |
 56.79      1.43     1.28       1.45    238             RESCUE              ****************************                      |
 57.75      1.00     2.24*      1.07    366             COOP ED SERV        *****************************                     |
 57.83      0.83     2.31*      0.88    618             CREC                *****************************                     |
 54.93      0.83    -0.58       0.98    397             ACES                ***************************|                      |
 56.56      1.58     1.05       1.55    250             PROJECT LEARN       ****************************                      |
 57.09      2.53     1.58       2.52    128             NARSES              *****************************                     |
                   NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

                    APPLY THE FUNDAMENTAL PRINCIPALS OF SCIENCE
                                                                                                   P-VALUE
           SE OF     GROUP   SE OF  SAMPLE                                   0    10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE    EFFECT  EFFECT    SIZE           REPORTING GROUP         |....|....|....|....|....|....|....|....|....|....|
                                                                             |                                                 |
  49.36     0.61                      2301           ALL STUDENTS            **************************                        |
                                                                             |                        |                        |
----SEX OF THE STUDENT                        ----                           |                        |                        |
  54.52     0.82     5.15*    0.42    1094           MALE                    ****************************                      |
  44.72     0.61    -4.64*    0.38    1204           FEMALE                  ***********************  |                        |
                                                                             |                        |                        |
----HOW DO YOU FEEL ABOUT SCIENCE?            ----                           |                        |                        |
  39.56     0.80    -9.81*    0.73     313           LEAST FAVORITE          *********************    |                        |
  45.77     0.63    -3.59*    0.43     955           NOT MY FAVORITE         ************************ |                        |
  54.88     0.83     5.52*    0.48     902           FAVORITE                ****************************                      |
  61.43     1.69    12.07*    1.48     125           MOST FAVORITE           ********************************                  |
                                                                             |                        |                        |
----TIME SPENT ON ACTIVITIES?                 ----                           |                        |                        |
  41.61     0.96    -7.75*    0.87     405           HARDLY EVER             **********************   |                        |
  47.37     0.93    -2.00*    0.75     392           MONTHLY                 *************************|                        |
  53.25     0.63     3.89*    0.36    1196           WEEKLY                  ****************************                      |
  47.85     1.34     -1.52    1.11     285           DAILY                   *************************|                        |
                                                                             |                        |                        |
----HOW VALUABLE IS THE STUDY OF SCIENCE?     ----                           |                        |                        |
  37.98     2.88   -11.39*    2.99      34           USELESS                 ********************     |                        |
  39.26     1.84   -10.10*    1.52     125           NOT VALUABLE            *********************    |                        |
  46.38     0.59    -2.98*    0.46     910           VALUABLE                ************************ |                        |
  52.97     0.78     3.61*    0.39    1228           VERY VALUABLE           ***************************                       |
                                                                             |                        |                        |
----DO YOU HAVE A SCIENCE HOBBY?              ----                           |                        |                        |
  53.69     1.13     4.33*    0.90     541           YES                     ****************************                      |
  48.07     0.61    -1.30*    0.23    1752           NO                      *************************|                        |
                                                                             |                        |                        |
----ENJOY WATCHING SHOW - VISITING MUSEUM?    ----                           |                        |                        |
  57.59     1.16     8.23*    0.87     507           ENJOY                   ******************************                    |
  48.39     0.67    -0.97*    0.27    1388           O.K.                    *************************|                        |
  42.42     0.77    -6.95*    0.74     401           DON'T ENJOY             **********************   |                        |
                                                                             |                        |                        |
----LECTURES BY SCHOOL TEACHERS?              ----                           |                        |                        |
  52.24     2.49      2.88    2.18     122           ENJOY                   ***************************                       |
  52.04     0.91     2.68*    0.49    1019           O.K.                    ***************************                       |
  46.76     0.50    -2.60*    0.42    1150           DON'T ENJOY             ************************ |                        |
                                                                             |                        |                        |
----CLASS DISCUSSION OF SCIENCE TOPICS?       ----                           |                        |                        |
  54.28     1.18     4.91*    0.78     597           ENJOY                   ****************************                      |
  48.86     0.57     -0.50    0.29    1385           O.K.                    *************************|                        |
  42.38     0.95    -6.98*    0.90     308           DON'T ENJOY             **********************   |                        |
```

NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

APPLY THE FUNDAMENTAL PRINCIPALS OF SCIENCE

P-VALUE	SE OF P-VALUE	GROUP EFFECT	SE OF EFFECT	SAMPLE SIZE	REPORTING GROUP
49.36	0.61			2301	ALL STUDENTS
----READING ASSIGNED BOOKS ABOUT SCIENCE? ----					
54.99	3.07	5.62*	2.71	96	ENJOY
50.08	1.05	0.72	0.71	790	O.K.
48.68	0.56	-0.69	0.40	1403	DON'T ENJOY
----ACTUALLY DOING LABORATORY EXPERIMENTS? ----					
51.88	0.72	2.51*	0.33	1305	ENJOY
46.93	0.69	-2.43*	0.42	836	O.K.
42.46	1.56	-6.90*	1.50	149	DON'T ENJOY
----WATCHING TEACHER DO EXPERIMENTS? ----					
50.37	1.01	1.01	0.64	806	ENJOY
49.31	0.61	-0.05	0.34	1238	O.K.
47.10	1.13	-2.27*	1.05	245	DON'T ENJOY
----HOW VALUABLE WILL SCIENCE COURSES BE? ----					
40.05	0.97	-9.32*	0.98	167	USELESS
44.12	0.64	-5.25*	0.43	834	NOT VALUABLE
51.75	0.75	2.39*	0.53	886	VALUABLE
58.89	1.32	9.53*	1.00	406	VERY VALUABLE
----LAST TIME YOU TOOK A SCIENCE COURSE? ----					
36.67	1.05	-12.69*	1.08	155	TWO YEARS AGO
42.24	0.57	-7.12*	0.52	800	LAST YEAR
55.05	0.63	5.69*	0.32	1344	NOW
----TOOK GENERAL SCIENCE? ----					
47.89	0.78	-1.48*	0.48	1091	YES
51.37	0.75	2.01*	0.46	1030	NO
44.41	1.67	-4.96*	1.58	99	DON'T KNOW
----TOOK EARTH SCIENCE? ----					
49.15	0.71	-0.22	0.52	1157	YES
49.85	0.83	0.48	0.53	987	NO
47.11	2.05	-2.26	1.76	77	DON'T KNOW
----TOOK BIOLOGY? ----					
50.23	0.63	0.87*	0.20	2026	YES
43.12	1.57	-6.25*	1.52	241	NO
43.71	4.16	-5.66	3.98	17	DON'T KNOW

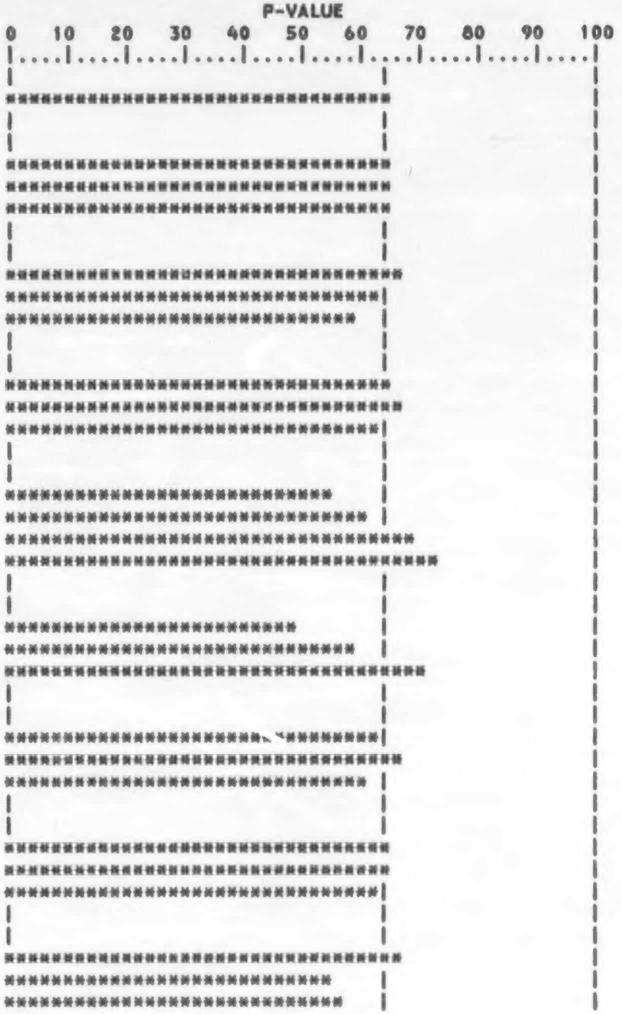


```
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                    CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

                        APPLY THE FUNDAMENTAL PRINCIPALS OF SCIENCE
                                                                                                   P-VALUE
          SE OF    GROUP    SE OF  SAMPLE                                                    0    10   20   30   40   50   60   70   80   90  100
P-VALUE  P-VALUE  EFFECT   EFFECT   SIZE           REPORTING GROUP                           |....|....|....|....|....|....|....|....|....|....|
                                                                                             |                        |                        |
 49.36     0.61                       2301          ALL STUDENTS                             **************************                        |
                                                                                             |                        |                        |
----TOOK CHEMISTRY?                         ----                                             |                        |                        |
 57.16     0.66      7.80*    0.49   1133          YES                                       ******************************                    |
 41.80     0.64     -7.56*    0.52   1060          NO                                        **********************   |                        |
 40.80     2.47     -8.56*    2.45     21          DON'T KNOW                                *********************    |                        |
                                                                                             |                        |                        |
----TOOK PHYSICS?                           ----                                             |                        |                        |
 55.27     1.53      5.90*    1.27    384          YES                                       *****************************                     |
 48.07     0.59     -1.29*    0.28   1718          NO                                        *************************|                        |
 46.79     2.67     -2.58     2.38     33          DON'T KNOW                                ************************ |                        |
                                                                                             |                        |                        |
----TOOK SECOND-YEAR BIOLOGY?               ----                                             |                        |                        |
 50.33     1.73      0.96     1.52    198          YES                                       **************************                        |
 49.21     0.61     -0.16     0.18   1896          NO                                        **************************                        |
 50.35     2.76      0.98     2.79     39          DON'T KNOW                                **************************                        |
                                                                                             |                        |                        |
----TOOK SECOND-YEAR CHEMISTRY?             ----                                             |                        |                        |
 63.54     2.90     14.18*    2.76     47          YES                                       *********************************                 |
 48.99     0.62     -0.37*    0.14   2049          NO                                        *************************|                        |
 50.58     3.04      1.22     2.96     31          DON'T KNOW                                **************************                        |
                                                                                             |                        |                        |
----TOOK SECOND-YEAR PHYSICS?               ----                                             |                        |                        |
 46.48     1.84     -2.88     1.75     31          YES                                       ************************ |                        |
 49.31     0.63     -0.05     0.13   2057          NO                                        **************************                        |
 49.66     2.79      0.29     2.77     35          DON'T KNOW                                **************************                        |
                                                                                             |                        |                        |
----DOES SCHOOL OFFER VARIETY OF COURSES?   ----                                             |                        |                        |
 49.30     0.65     -0.06     0.22   1838          YES                                       **************************                        |
 49.99     1.02      0.62     0.88    451          NO                                        **************************                        |
                                                                                             |                        |                        |
----SCIENTISTS LET PEOPLE TEST BELIEFS?     ----                                             |                        |                        |
 50.70     0.65      1.34*    0.21   1752          AGREE                                     **************************                        |
 45.77     1.35     -3.59*    1.11    184          DISAGREE                                  ************************ |                        |
 44.94     0.87     -4.43*    0.82    362          UNDECIDED                                 ***********************  |                        |
                                                                                             |                        |                        |
----SCIENCE HELPS CONTROL NATURE?           ----                                             |                        |                        |
 48.66     0.76     -0.71*    0.31   1180          AGREE                                     *************************|                        |
 51.99     0.66      2.62*    0.49    735          DISAGREE                                  ***************************                       |
 46.77     0.96     -2.60*    0.84    381          UNDECIDED                                 ************************ |                        |
            NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
         CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

                        APPLY THE FUNDAMENTAL PRINCIPALS OF SCIENCE
                                                                                              P-VALUE
          SE OF    GROUP    SE OF SAMPLE                                0   10   20   30   40   50   60   70   80   90   100
P-VALUE P-VALUE   EFFECT   EFFECT    SIZE        REPORTING GROUP         |....|....|....|....|....|....|....|....|....|....|
                                                                        |                        |                        |
 49.36     0.61                       2301        ALL STUDENTS            **************************                        |
                                                                        |                        |                        |
----SCIENCE DOES NOT TELL RIGHT-WRONG?      ----                        |                        |                        |
 51.50     0.67     2.14*    0.28   1432        AGREE                   ***************************                       |
 46.26     0.99    -3.11*    0.72    395        DISAGREE                ************************ |                        |
 45.68     0.79    -3.69*    0.72    472        UNDECIDED               ************************ |                        |
                                                                        |                        |                        |
----SCIENCE HAS ANSWERS TO PROBLEMS?        ----                        |                        |                        |
 46.66     0.98    -2.70*    0.60    535        AGREE                   ************************ |                        |
 51.48     0.65     2.12*    0.38   1272        DISAGREE                ***************************                       |
 46.88     0.83    -2.49*    0.72    492        UNDECIDED               ************************ |                        |
                                                                        |                        |                        |
----SCIENCE CAN SOLVE HUMAN PROBLEMS?       ----                        |                        |                        |
 50.89     0.99     1.53*    0.57    756        AGREE                   **************************                        |
 48.82     0.65    -0.55     0.42    850        DISAGREE                *************************|                        |
 48.51     0.67    -0.86     0.48    693        UNDECIDED               *************************|                        |
                                                                        |                        |                        |
----SIZE OF COMMUNITY                       ----                        |                        |                        |
 42.28     2.62    -7.08*    2.38    304        BIG CITIES              **********************   |                        |
 50.10     0.97     0.74     0.97    592        FRINGE CITIES           **************************                        |
 49.91     0.77     0.54     0.83    647        MEDIUM CITIES           **************************                        |
 51.39     0.80     2.02*    0.79    758        SMALLER PLACES          ***************************                       |
                                                                        |                        |                        |
----REGION                                  ----                        |                        |                        |
 51.25     1.37     1.89     1.36    238        RESCUE                  ***************************                       |
 50.63     1.42     1.27     1.19    490        COOP ED SERV            **************************                        |
 50.27     1.13     0.91     0.93    685        CREC                    **************************                        |
 44.90     1.22    -4.46*    1.10    510        ACES                    ***********************  |                        |
 50.42     0.98     1.06     1.06    250        PROJECT LEARN           **************************                        |
 50.78     3.02     1.42     2.95    128        HARSES                  **************************                        |
                                                                        |                        |                        |
----REGION NOT INCLUDING BIG CITIES         ----                        |                        |                        |
 51.25     1.37     1.89     1.36    238        RESCUE                  ***************************                       |
 51.82     1.03     2.46*    1.03    366        COOP ED SERV            ***************************                       |
 51.46     0.92     2.09*    0.88    618        CREC                    ***************************                       |
 46.98     0.47    -2.39*    0.72    397        ACES                    ************************ |                        |
 50.42     0.98     1.06     1.06    250        PROJECT LEARN           **************************                        |
 50.78     3.02     1.42     2.95    128        HARSES                  **************************                        |
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                    CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

                        UNDERSTAND AND APPLY THE PROCESSES OF SCIENCE
                                                                                                   P-VALUE
          SE OF    GROUP    SE OF  SAMPLE                                    0   10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE  EFFECT   EFFECT   SIZE           REPORTING GROUP           |....|....|....|....|....|....|....|....|....|....|
                                                                             |                               |                 |
 64.42     0.80                     2301           ALL STUDENTS              *********************************                 |
                                                                             |                               |                 |
----SEX OF THE STUDENT                      ----                             |                               |                 |
 67.18     0.87     2.76*    0.44   1094           MALE                      ***********************************               |
 61.93     0.92    -2.48*    0.36   1204           FEMALE                    ********************************|                 |
                                                                             |                               |                 |
----HOW DO YOU FEEL ABOUT SCIENCE?          ----                             |                               |                 |
 55.04     1.36    -9.37*    0.99    313           LEAST FAVORITE            *****************************   |                 |
 62.04     0.82    -2.38*    0.48    955           NOT MY FAVORITE           ********************************|                 |
 69.01     0.96     4.60*    0.51    902           FAVORITE                  ************************************              |
 72.92     1.59     8.50*    1.30    125           MOST FAVORITE             *************************************             |
                                                                             |                               |                 |
----TIME SPENT ON ACTIVITIES?               ----                             |                               |                 |
 55.15     1.27    -9.27*    1.03    405           HARDLY EVER               *****************************   |                 |
 62.19     1.21    -2.22*    0.89    392           MONTHLY                   ********************************|                 |
 68.90     0.80     4.48*    0.46   1196           WEEKLY                    ***********************************               |
 63.35     1.47    -1.07     1.25    285           DAILY                     *********************************                 |
                                                                             |                               |                 |
----HOW VALUABLE IS THE STUDY OF SCIENCE?   ----                             |                               |                 |
 43.15     3.16   -21.27*    3.16     34           USELESS                   ***********************         |                 |
 51.10     2.26   -13.32*    1.76    125           NOT VALUABLE              ***************************     |                 |
 61.26     0.78    -3.16*    0.43    910           VALUABLE                  ********************************|                 |
 68.77     0.81     4.35*    0.37   1228           VERY VALUABLE             ***********************************               |
                                                                             |                               |                 |
----DO YOU HAVE A SCIENCE HOBBY?            ----                             |                               |                 |
 67.40     1.28     2.98*    0.89    541           YES                       ***********************************               |
 63.51     0.80    -0.91*    0.25   1752           NO                        *********************************                 |
                                                                             |                               |                 |
----ENJOY WATCHING SHOW - VISITING MUSEUM?  ----                             |                               |                 |
 70.38     1.23     5.96*    0.87    507           ENJOY                     ************************************              |
 64.08     0.87    -0.33     0.32   1388           O.K.                      *********************************                 |
 58.26     1.09    -6.15*    0.87    401           DON'T ENJOY               ******************************  |                 |
                                                                             |                               |                 |
----LECTURES BY SCHOOL TEACHERS?            ----                             |                               |                 |
 64.44     2.87     0.03     2.41    122           ENJOY                     *********************************                 |
 66.96     1.06     2.55*    0.51   1019           O.K.                      **********************************                |
 62.34     0.68    -2.08*    0.46   1150           DON'T ENJOY               ********************************|                 |
                                                                             |                               |                 |
----CLASS DISCUSSION OF SCIENCE TOPICS?     ----                             |                               |                 |
 69.13     1.43     4.71*    0.87    597           ENJOY                     ************************************              |
 64.08     0.72    -0.33     0.33   1385           O.K.                      *********************************                 |
 57.50     1.14    -6.92*    0.98    308           DON'T ENJOY               ******************************  |                 |
```

NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

UNDERSTAND AND APPLY THE PROCESSES OF SCIENCE

P-VALUE	SE OF P-VALUE	GROUP EFFECT	SE OF EFFECT	SAMPLE SIZE	REPORTING GROUP
64.42	0.80			2301	ALL STUDENTS
----READING ASSIGNED BOOKS ABOUT SCIENCE? ----					
64.79	3.21	0.38	2.73	96	ENJOY
64.88	1.31	0.47	0.85	790	O.K.
64.31	0.70	-0.10	0.47	1403	DON'T ENJOY
----ACTUALLY DOING LABORATORY EXPERIMENTS? ----					
66.37	0.84	1.95*	0.37	1305	ENJOY
62.87	0.96	-1.54*	0.49	836	O.K.
58.09	1.74	-6.32*	1.52	149	DON'T ENJOY
----WATCHING TEACHER DO EXPERIMENTS? ----					
64.63	1.28	0.21	0.70	806	ENJOY
65.02	0.72	0.61	0.38	1238	O.K.
61.80	1.24	-2.61*	1.14	245	DON'T ENJOY
----HOW VALUABLE WILL SCIENCE COURSES BE? ----					
54.84	1.39	-9.58*	1.30	167	USELESS
60.18	0.82	-4.23*	0.44	834	NOT VALUABLE
67.07	0.87	2.66*	0.43	886	VALUABLE
71.50	1.39	7.09*	0.96	406	VERY VALUABLE
----LAST TIME YOU TOOK A SCIENCE COURSE? ----					
47.76	1.78	-16.65*	1.59	155	TWO YEARS AGO
58.25	0.88	-6.17*	0.55	800	LAST YEAR
70.03	0.67	5.62*	0.39	1344	NOW
----TOOK GENERAL SCIENCE? ----					
62.68	1.00	-1.73*	0.59	1091	YES
66.66	0.91	2.24*	0.51	1030	NO
59.70	2.00	-4.71*	1.88	99	DON'T KNOW
----TOOK EARTH SCIENCE? ----					
64.81	0.74	0.39	0.62	1157	YES
64.18	1.11	-0.24	0.58	987	NO
61.59	3.56	-2.83	3.16	77	DON'T KNOW
----TOOK BIOLOGY? ----					
65.81	0.75	1.39*	0.24	2026	YES
54.63	1.76	-9.79*	1.60	241	NO
55.39	5.83	-9.02	5.59	17	DON'T KNOW



```
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                    CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

                        UNDERSTAND AND APPLY THE PROCESSES OF SCIENCE
                                                                                                  P-VALUE
          SE OF    GROUP    SE OF  SAMPLE                                    0    10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE  EFFECT   EFFECT   SIZE           REPORTING GROUP           |....|....|....|....|....|....|....|....|....|....|
                                                                             |                               |                 |
 64.42     0.80                     2301           ALL STUDENTS              ********************************                  |
                                                                             |                               |                 |
----TOOK CHEMISTRY?                         ----                             |                               |                 |
 71.94     0.70     7.52*    0.53   1133           YES                       ************************************              |
 57.14     0.89    -7.28*    0.53   1060           NO                        *****************************   |                 |
 54.86     4.49    -9.55*    4.24     21           DON'T KNOW                ***************************     |                 |
                                                                             |                               |                 |
----TOOK PHYSICS?                           ----                             |                               |                 |
 67.56     1.68     3.14*    1.32    384           YES                       **********************************                |
 63.62     0.77    -0.79*    0.29   1718           NO                        ********************************                  |
 62.85     3.65    -1.57     3.30     33           DON'T KNOW                *******************************|                 |
                                                                             |                               |                 |
----TOOK SECOND-YEAR BIOLOGY?               ----                             |                               |                 |
 64.08     1.99    -0.34     1.54    198           YES                       ********************************                  |
 64.40     0.76    -0.02     0.19   1896           NO                        ********************************                  |
 61.06     3.79    -3.36     3.79     39           DON'T KNOW                *******************************|                 |
                                                                             |                               |                 |
----TOOK SECOND-YEAR CHEMISTRY?             ----                             |                               |                 |
 75.29     3.67    10.88*    3.45     47           YES                       **************************************            |
 64.12     0.81    -0.30     0.16   2049           NO                        ********************************                  |
 62.99     3.70    -1.43     3.64     31           DON'T KNOW                *******************************|                 |
                                                                             |                               |                 |
----TOOK SECOND-YEAR PHYSICS?               ----                             |                               |                 |
 59.77     2.51    -4.65*    2.31     31           YES                       ******************************  |                 |
 64.41     0.80    -0.00     0.14   2057           NO                        ********************************                  |
 60.78     3.58    -3.64     3.48     35           DON'T KNOW                ******************************  |                 |
                                                                             |                               |                 |
----DOES SCHOOL OFFER VARIETY OF COURSES?   ----                             |                               |                 |
 64.86     0.82     0.44     0.23   1838           YES                       ********************************                  |
 63.07     1.18    -1.34     0.95    451           NO                        ********************************                  |
                                                                             |                               |                 |
----SCIENTISTS LET PEOPLE TEST BELIEFS?     ----                             |                               |                 |
 65.99     0.81     1.58*    0.23   1752           AGREE                     *********************************                 |
 58.75     1.67    -5.67*    1.32    184           DISAGREE                  *****************************   |                 |
 59.86     1.03    -4.56*    0.88    362           UNDECIDED                 ******************************  |                 |
                                                                             |                               |                 |
----SCIENCE HELPS CONTROL NATURE?           ----                             |                               |                 |
 63.15     1.01    -1.27*    0.38   1180           AGREE                     ********************************                  |
 66.68     0.79     2.27*    0.60    735           DISAGREE                  *********************************                 |
 64.42     0.96     0.01     0.79    381           UNDECIDED                 ********************************                  |
                       NATIONAL EVALUATION SYSTEMS, INC. -- CONTENT ANALYSIS BY REPORTING GROUPS
                    CONNECTICUT ASSESSMENT OF EDUCATIONAL PROGRESS - SCIENCE - GRADE 11 - SPRING 1980

                        UNDERSTAND AND APPLY THE PROCESSES OF SCIENCE
                                                                                                   P-VALUE
          SE OF    GROUP    SE OF  SAMPLE                                    0   10   20   30   40   50   60   70   80   90   100
P-VALUE  P-VALUE  EFFECT   EFFECT   SIZE           REPORTING GROUP           |....|....|....|....|....|....|....|....|....|....|
                                                                             |                               |                 |
 64.42     0.80                     2301           ALL STUDENTS              *********************************                 |
                                                                             |                               |                 |
----SCIENCE DOES NOT TELL RIGHT-WRONG?      ----                             |                               |                 |
 67.04     0.73     2.62*    0.30   1432           AGREE                     ***********************************               |
 59.14     1.19    -5.27*    0.72    395           DISAGREE                  ******************************* |                 |
 61.12     1.03    -3.30*    0.66    472           UNDECIDED                 ********************************|                 |
                                                                             |                               |                 |
----SCIENCE HAS ANSWERS TO PROBLEMS?        ----                             |                               |                 |
 60.79     1.33    -3.63*    0.73    535           AGREE                     ******************************* |                 |
 66.75     0.68     2.33*    0.46   1272           DISAGREE                  **********************************                |
 62.51     1.11    -1.91*    0.78    492           UNDECIDED                 ********************************|                 |
                                                                             |                               |                 |
----SCIENCE CAN SOLVE HUMAN PROBLEMS?       ----                             |                               |                 |
 64.45     1.17     0.04     0.56    756           AGREE                     *********************************                 |
 64.70     0.78     0.28     0.44    850           DISAGREE                  *********************************                 |
 64.22     0.82    -0.20     0.53    693           UNDECIDED                 *********************************                 |
                                                                             |                               |                 |
----SIZE OF COMMUNITY                       ----                             |                               |                 |
 53.11     3.40   -11.30*    3.09    304           BIG CITIES                ****************************    |                 |
 65.64     0.93     1.22     1.09    592           FRINGE CITIES             **********************************                |
 65.31     0.83     0.90     0.96    647           MEDIUM CITIES             **********************************                |
 67.57     0.81     3.15*    0.95    758           SMALLER PLACES            ***********************************               |
                                                                             |                               |                 |
----REGION                                  ----                             |                               |                 |
 66.35     1.05     1.93     1.24    238           RESCUE                    **********************************                |
 64.52     1.98     0.10     1.66    490           COOP ED SERV              *********************************                 |
 65.37     1.43     0.95     1.20    685           CREC                      **********************************                |
 60.01     1.92    -4.40*    1.65    510           ACES                      ******************************* |                 |
 67.56     1.46     3.15*    1.54    250           PROJECT LEARN             ***********************************               |
 65.88     2.75     1.47     2.75    128           NARSES                    **********************************                |
                                                                             |                               |                 |
----REGION NOT INCLUDING BIG CITIES         ----                             |                               |                 |
 66.35     1.05     1.93     1.24    238           RESCUE                    **********************************                |
 66.75     0.94     2.33*    1.09    366           COOP ED SERV              **********************************                |
 66.98     1.03     2.57*    1.06    618           CREC                      **********************************                |
 63.52     0.81    -0.90     1.04    397           ACES                      *********************************                 |
 67.56     1.46     3.15*    1.54    250           PROJECT LEARN             ***********************************               |
 65.88     2.75     1.47     2.75    128           NARSES                    **********************************                |
```